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The Buyers' Market

Preparations at the British Industries Fair

LAST year there were many who considered that the holding of a British Industries Fair was premature. Two years after the complete disorganization of normal production resulting from the war was, they thought, too short a period for manufacturers to recover sufficiently to present to the world a display truly worthy of the high traditions of British industry. Most firms had barely tooled up for their post-war products and in many cases only prototypes were on view.

With delivery dates many months, if not years, ahead it might well have been argued that from neither the sellers' nor the buyers' points of view was the Fair likely to be of any great value. The manufacturer could reasonably look forward to selling all he could make for a considerable time ahead, while overseas buyers were liable to become impatient at delays and tend to take their custom elsewhere.

Events of the past year have to a large extent falsified this argument. There are signs that the sellers' market, which twelve months ago appeared likely to last for several years, is contracting very rapidly, while further restrictions on supplies of goods for the home market have substantially eased the overseas delivery position.

Whatever, therefore, may have been the merits or demerits of holding the Fair last year there can be no doubt as to the valuable opportunities for increasing overseas trade which this year's exhibition (opened last Monday) has before it. From the electrical products point of view this is more than ever true. The four hundred electrical exhibitors at Birmingham, together with another hundred or so in London, provide an unequalled opportunity for the foreign buyer to see the latest British developments.

Illustrated surveys by our representatives at the British Industries Fair will appear in next week's* Electrical Review. *They will cover the latest developments in industrial and domestic equipment

With the prospects of less easy selling conditions manufacturers have not been content to rely on the assumption that what is good enough for the home country is automatically suitable for overseas. The great amount of market research which has been going on during the past few months is now producing visible results in the form of apparatus designed specially to meet the peculiar requirements of other countries in which the climatic conditions or local preferences may be quite different from ours.

In "going all out" for these overseas markets in compliance with the Government's export trade policy manufacturers, particularly those making domestic appliances, are, however, taking something of a risk. It has yet to be proved that an electrical manufacturer can prosper on export sales only no matter how well

received his products may be and it is only fair that he should be assured of at least the prospects of a reasonably large and expanding home market.

Good Relations

If the trade union leaders present at last week's luncheon arranged by the British Electricity Authority have their members solidly behind them there seems to be little fear of serious labour trouble in the nationalized electricity supply industry. The luncheon, held to celebrate the inauguration of " conciliation machinery " was a most friendly one —although, as Mr. Gaitskell remarked, this friendliness was traditional in the industry. There was stern realism in Lord Citrine's reminder that although the industry was no longer a profit-making one it could not be a loss-making one either; it had to be run on commercial lines and could not accede to every request for increased remuneration. That needed saying: a public service must be run in the interest of the public (which, of course, includes the employees themselves).

Gas-Turbine Stations

Although the gas cycle possesses inherently greater thermodynamic possibilities than does the steam cycle, these do not at the present stage of development provide good reasons for any large-scale adoption of the principle, although the gaining of practical experience in the design and operation of gas turbines is most desirable. Other, more immediate, advantages are, however, to be found in their use for standby and peak-load purposes. These are exemplified in the choice of open-cycle machines in the 40,000-kW gas-turbine station at Beznau, Switzerland, particulars of which are given on the opposite page.

Building Material Inquiry

Lord Simon of Wythenshawe's Committee of inquiry into the distribution of building materials has presented its report to the Minister of Works (H.M. Stationery Office, 2s. 6d.). The Committee is critical of the present system which, it says, results in raising building costs. It recommends improvements in merchants' accountancy and handling methods and suggests, as a short-term measure, that the Government should take action to control distributors' margins. The ultimate aim should be to eliminate restrictive practices and the Committee suggests ways in which this should be done. In the meantime the Government has introduced the Monopoly Bill which is designed to deal with such matters as this. How far the electrical industry is implicated in this business is not clear, and in any event the Committee shows that in a typical 900 sq ft house in May, 1947, " electricians' materials " represented only 3 per cent of the total cost. We think that the report treats the Electrical Fair Trading Committee rather summarily when it suggests that there is little practical distinction between its policy and the agreements prevailing in the industries which deal with building materials in the strict sense of that term.

Personal Opinion

It is no doubt good that cherished beliefs should be questioned from time to time. Even if Mr. R. B. Giles is unlikely to make many converts to the views expressed in his I.E.E. paper on the economic utilization of electricity, he provided an opportunity for those with greater faith in the future of electricity to substantiate their reasons. His contentions, it seemed to us, were vitiated chiefly by leaving out of account the unsuitability for other purposes of the coal burned for generating electricity and by underestimating the value to the public of such important items as labour saving and cleanliness.

Amenity Preservation

It is seen from the 1947 report of the Council for the Preservation of Rural England that the Council is still torn between its anxiety to encourage the use of electricity in country areas and its desire that rural electrification shall not disfigure the countryside. As cost is a principal consideration, these two aspects are not easily reconciled. The Council suggests that the profit on urban electricity supply (which is usually provided by underground cables) is big enough to warrant more generous treatment of rural areas. The Council advocates greater use of trench-cutting and cable-laying machinery. If cables can be laid at a much cheaper rate it may be possible to use them in areas where scenic beauty should be preserved and their use is encouraged at the moment by the chronic shortage of poles.

Gas Turbines

Open-Cycle Designs

As a result of pioneering work on jet aircraft in this country during the war, manufacturers here have been assisted in obtaining the fundamental data requisite for the design of gas turbines for commercial purposes. Considerable progress has been made since the technical principles of the open- and closed-cycle designs were discussed in the *Electrical Review* of 23rd June, 1944. However, while headway is being made in the construction of units for railway and marine propulsion, conditions have not hitherto encouraged development of machines of the large capacities required for public electricity supply, an adverse factor being the high cost of fuel oil.

On the other hand, the growing need to meet peak loads with plant of relatively low capital cost which can quickly be put into commission and which occupies little space gives the gas turbine immediate value, while expectations of improvements in thermal efficiencies and other economies make its development very desirable.

With such considerations in mind, the Central Electricity Board in its final Annual Report (*Electrical Review*, 26th March) referred to the ordering last year of two 15,000-kW gas turbines for Dunston and Trafford power stations. These machines, the first of which is to be manufactured by the Metropolitan - Vickers Co. and the second by Parsons, are of the open-cycle type of which several of 10,000 kW and over have been built abroad since the first unit for the generation of electricity, a 4,000-kW Brown-Boveri set, was installed for emergency use at Neuchâtel, Switzerland, shortly before the war.

The largest installation yet put in hand is one of 40,000 kW, comprising two Brown-Boveri sets of 27,000 and 13,000 kW, at Beznau on the river Aare, near Baden. The station is owned by the Nord-Ost Schweizerische Kraftwerke, a distributing organization which takes power in bulk from four generating companies at a low tariff which provides for the cutting of the supply at short notice. This provision is a result of the great increase during the war in the use of electricity in Switzerland, which has caused the demand to outstrip the capacity of the generating plant; the shortage is expected to continue for the next five years.

Accordingly, plant was required that could deal with peaks and take up load rapidly under any conditions, particularly in winter. A high-head hydro-electric station would have taken from five to seven years to complete and would have necessitated the construction of a reservoir involving inundation of valuable land and possibly a village. A low-head river plant offered no advantage in time of construction, with the liability of insufficient water in winter and too much water at zero head in summer; lake storage entailed objections similar to those against a high-head scheme.

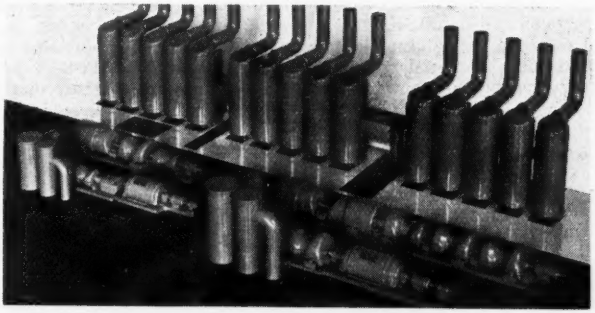


Fig. 1.—Layout of Beznau power station

On the other hand the smaller of the two gas turbines was built, erected on site and made ready for service all within twelve months, and the larger will be installed within the next year. Other considerations were minimum physical dimensions and the availability of only a small amount of water. The stipulation of a quick start and take-up of load determined the selection of the open-cycle design. Storage for fuel oil sufficient for one year's operation is provided by a series of tanks (built by Sulzer) immediately adjacent to the station.

Total cost of production per kWh is expected to be about the same as for a high-head water plant but up to two and a half times that for a low-head plant. As about half of this cost is divisible equally between fuel and capital charges, whereas with a hydro-electric scheme capital charges would account for nearly the whole, this gives a clear advantage to gas turbines that are intended for standby and peak-load operation.

Overall thermal efficiency will be higher during the critical winter months than in summer owing to the greater density of the colder air, the temperature of which averages 41 deg F (5 deg C). This is because cycle efficiency increases and compression work decreases in proportion to the absolute temperature. Under these conditions thermal efficiencies of 30 to 40 per cent are expected to be achieved. Compression input is about three times the net output. As the latter is the difference between turbine output and compressor input, the proportionate increase of net output is much greater. Also, since the axial compressor works at approximately constant volume, air delivery rises as the temperature decreases. It has been found in practice that a lowering of the inlet temperature by 27 to 36 deg F (15 to 20 deg C) gives 25 per cent more output with an improvement of 5 per cent in efficiency.

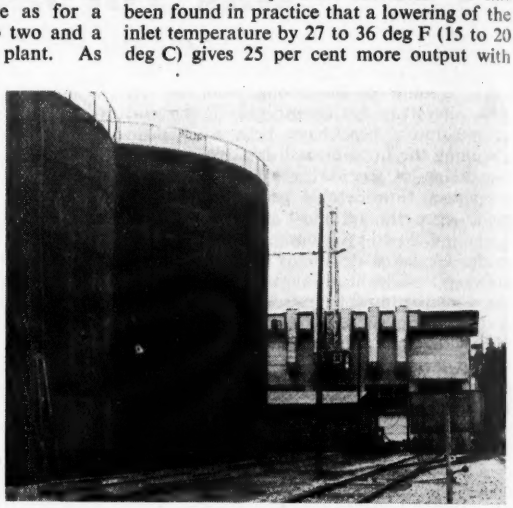


Fig. 3.—Fuel storage tanks installed on the Beznau site

The layout of the Beznau station is shown in Fig. 1. In the foreground on the left are the high-pressure unit, which drives a 16,000-kVA 8-kV 3,000-r.p.m. 50-cycle alternator, and two combustion chambers; behind is the low-pressure compressor, and in the background five heat exchangers. On the right the components of the 27,000-kW set (including 33,000-kVA alternator and ten heat exchangers) are similarly arranged. Intercoolers for the compressors, the air coolers for the alternators, oil coolers and auxiliaries are installed in the basement.

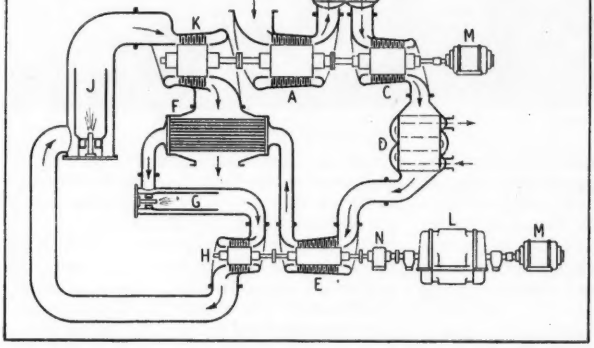


Fig. 2.—Diagram of two-stage combustion turbine with heat exchanger
A.—L.p. compressor 1. B.—Air re-cooler 1. C.—L.p. compressor 2. D.—Air re-cooler 2. E.—H.p. compressor. F.—Recuperator. G.—H.p. combustion chamber. H.—H.p. gas turbine. J.—L.p. combustion chamber. K.—L.p. gas turbine. L.—Generator. M.—Starting motor. N.—Gearing

The working medium is provided by gas from the combustion of oil which enters the turbines at temperatures below 1,100 deg F (593 deg C). In the diagrammatic arrangement of

the 13,000-kW set in Fig. 2 the passage of the gas is indicated. The recuperator transfers up to 90 per cent of the heat in the exhaust gases to the air entering the combustion chamber and is a major factor in raising thermal efficiency. It adds considerably to the capital cost, but has the compensating advantage that it need be provided only if an efficiency greater than 21 per cent is required. Its capacity can be varied to give the lowest overall cost for the running conditions envisaged.

Interstage cooling and reheating both improve efficiency and, in addition, substantially increase the power for the same volume of air, thus reducing the price per kW installed. Water required for the coolers is about one-eighth of that for a steam turbine of equivalent electrical rating. The set can be run up from cold and synchronized within ten minutes.

This article is based on information communicated by Mr. G. Geoffrey Smith, author of "Gas Turbines and Jet Propulsion" and a director of Associated Iliffe Press, Ltd., following a visit to Beznau power station in company with Dr. Adolf Meyer, chief research engineer, Brown-Boveri Co., whose collaboration is gratefully acknowledged, and Mr. F.C. Sheffield who represented the *Electrical Review*.

Century of Electric Lighting

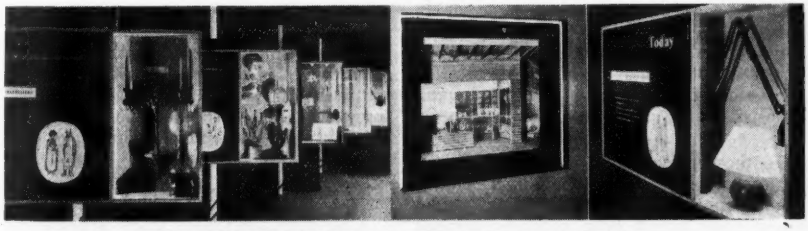
"Darkness into Daylight" Exhibition

TWO mark one hundred years of research and achievement in electric lighting the Science Museum, South Kensington, assisted by the Electric Lamp Manufacturers' Association, has staged a "Darkness into Daylight" Exhibition, illustrating the history of illumination from the earliest biblical times when man's first lamp was a hollow stone with fibre burning in animal fat, to the firebrand and pine splinter of the middle ages, right down to the latest developments in fluorescent lighting. Lighting fittings through the ages face six dioramas showing that more progress has been made in artificial lighting in the past 100 years than in the previous 5,000 years.

In a section telling the story of the development of the electric filament lamp is the original carbon filament lamp produced by Swan in 1878, and all the many hundreds of types of modern lamps which have been developed from this original.

These include the largest and smallest lamps in the world, a 10,000-W lighthouse lamp and a minute medical lamp for use in examining the internal parts of the human body. Further illustrating the remarkable developments in illumination are representations of pre-war Piccadilly Circus with its flashing signs, modern floodlighting, new safety methods of street lighting, and high-intensity lighting for theatres, films, television, etc.

Push-button apparatus shows the various stages in the development of the fluorescent lamp and special attention being drawn to the increased illumination and the greater working efficiency of the new lighting. The latest development, the xenon arc lamp, 5,000 W and water-cooled, has the best colour-rendering qualities yet produced. A model set-piece indicates the remarkable possibilities in the application of lighting in the living room of the future. Light from invisible sources enhances the effect of daylight in the right places. A recorded explanation is given of the origin of the light, its advantages and economies. Another full-size model shows a miner at the coal face working in "sunlight" emanating from fluorescent lamps.



Comparison of early nineteenth century and present-day lighting

An illustrated handbook published in connection with the exhibition is available from H.M. Stationery Office (price, 1s.).

Sales Managers' Conference. — The Incorporated Sales Managers' Association is holding its annual conference from 21st to 24th May at the Burlington Hotel, Bournemouth.

Views on the News

Reflections on Current Topics

ALL over the Castle Bromwich premises when I visited them last Friday (30th April) I saw a notice to exhibitors warning them that 30th April was press day and asking them to have their stands ready. The notices seem to have had very little effect, for practically all of the stands were either shrouded in hessian or being wired, carpentered or painted. Lorries were running in and out and every now and again the unsuspecting visitor was almost knocked down by lads on bicycles. In spite of the chaotic state it was evident that this year's Fair was going to be the best and brightest of the series. No doubt miracles were wrought again at the week-end and order prevailed at Monday's opening, but I always wonder how it's done.

* * *

" Janus " of the *Gas Times* is angry at the raising of the purchase tax on gas and electric " space " heaters to 100 per cent, complaining that because electrical generating plant is short and electric fires therefore most undesirable the gas industry (or gas consumer) has to suffer. It is, of course, most unfair, but I seem to recall that for some weeks of last year (when coal economy was the major consideration) electricity consumers were forbidden to use electricity during certain hours of the day while gas consumers were unrestricted. That, too, was most unfair. Anyway the indiscriminate use of gas fires is as bad as the similar use of electric fires for the need for the utmost fuel economy still persists.

* * *

To those present last week at the dinner of the thriving I.E.E. Installations Section, it would appear strange that only within recent years has it been generally realized that the technique of utilization of electricity is quite on a par with the design of apparatus and the production and distribution of energy, even though many men of professional eminence—such as Mr. P. Good, this year's president—were at one time engaged on that side of the work. It was not until 1936 that full recognition was given to this field of activity, with a clear lead to do something about it, in Mr. H. T. Young's presidential address. Mr. Young, who was hailed by the chairman, Mr. R. H. Rawll, as the " father of the Section," seemed to be unashamedly proud of his progeny, which now has a membership of nearly 3,000. The rapid progress made since the Section was established in 1941 has fully justified the advocacy of such a section by Mr. S. W. Melsom in the *Electrical Review* two years earlier.

* * *

I am led to wonder what sort of training in citizenship is given in schools nowadays when I read a report from the Western Region of British Railways that recently three schoolboys broke 300 electric lamps, twenty lampshades and three windows in one train. The damage was put at about £35; the boys were placed on probation for two years and they (or their parents) had to find £5 costs. From all parts of the country I have accounts of smashed street lamps and in some districts it is a rarety to find a usable telephone kiosk. Are we relying too much on " moral suasion " nowadays rather than old-fashioned methods of dealing with young delinquents?

* * *

A squirrel-cage motor sounds like a suitable stamping ground for other rodents, to wit " mice and rats and such small deer." A number of breakdowns due to their hunger for insulation (together with numerous mishaps resulting from human fallibility) are recorded in the last Technical Report of the British Engine, Boiler & Electrical Insurance Co. I shoula think that as a holocaust the sixty-four dead mice found in one burnt-out machine must constitute a record.

* * *

A credulity-stretching story appeared in the city section of the *Daily Express* one day last week. It told of Sir George Usher's decision to set up Aberdare Cables, Ltd., to produce cables independently of the " ring." When the " ring " heard of it, the story goes, they threatened to build a boiler factory in opposition to Sir George's International Combustion, Ltd., whereupon Sir George offered to sell them one to save trouble. The offer was evidently not accepted for I have not yet seen or heard of a C.M.A. boiler.—**REFLECTOR.**

B.E.A.M.A. Annual Meeting

Representation of All Sections on Council

THE annual general meeting of the British Electrical & Allied Manufacturers' Association (Inc.) was held recently at the Connaught Rooms, London, W.C.2. In the absence abroad of the chairman, Sir George Nelson, the chair was taken by Mr. E. C. Holroyde, vice-chairman of the Council. The annual report and accounts (*Electrical Review*, 23rd April, p. 621) were adopted unanimously.

In presenting the report, the chairman said that in spite of the many difficulties that had to be faced, the industry had succeeded in raising its production to a volume exceeding that of 1938, and there was every prospect of the industry being able to meet the new export targets, as well as going a long way towards satisfying the urgent home needs. The Association continued its efforts to overcome shortage of materials.

Exports and Foreign Competition

The electrical industry was an important factor in the export trade of this country and would be able to make a valuable contribution towards achieving the desired balance of trade in the dollar and sterling areas. To do this, and to maintain it in the future against increasing foreign competition, the highest degree of production efficiency would be essential. With the import and exchange restrictions imposed in many countries and the development of local manufacture in some of them, the selling overseas of a large percentage of output of the industry would become increasingly difficult. Selling efforts would need to be of the highest order.

The B.E.A.M.A. Council took an active part in the proposals put forward by the F.B.I. to the Chancellor of the Exchequer on the subject of prices and profits, and had laid emphasis on the necessity for a greater quantity of goods being produced each week by the same number of people during the period of economic recovery.

The Association had already had discussions with the chairman and members of the British Electricity Authority and very friendly relations had been established. Continued close consultation was recognized as being essential for the future development of the industry, and there was reason to anticipate the formation of new committees to continue these joint efforts.

In the past it had been suggested that the Council was too representative of the heavy side of the industry. In its present "make-up" 50 per cent of the members of the Council represented medium or small firms in the industry. It was the Council's practice to ensure that every section was represented.

In September last a Council Committee was interviewed by the Minister of Supply on the Export Plan, and the delegation expressed confidence that, given the materials and labour, the industry would be able to reach, if not exceed, the export targets set in most branches.

The Association continued to give attention to all aspects of the export trade and a representative committee had been set up under the chairmanship of the Export Director (Mr. D. M. Buist), with wide terms of reference. Mr. Holroyde recommended to the attention of members the report of the Government Trade Mission to China (of which Mr. Buist was a member) particularly that portion dealing with the development of the electrical industry in that country. Mr. Buist had also paid a visit to Austria at the suggestion of the Board of Trade, with regard to the proposals for extensive electrical development in that country. The Association had held conferences with representatives of many other countries on their future needs of electrical equipment.

Mr. Holroyde announced that the following eight members of the Association had been elected to the Council for 1948-49 session:—Belliss & Morcom, Ltd.; Brush Electrical Engineering Co., Ltd.; George Ellison, Ltd.; Evershed & Vignoles, Ltd.; Ferguson, Pailin, Ltd.; Jackson Electric Stove Co., Ltd.; Metropolitan-Vickers Electrical Co., Ltd.; and the Mirrlees Watson Co., Ltd.

At the subsequent meeting of the new Council the following firms were co-opted members of the Council:—Arc Manufacturing Co., Ltd.; Birlec, Ltd.; English Electric Co., Ltd.; Johnson & Phillips, Ltd.; M.K. Electric, Ltd.; Nalder Bros. & Thompson, Ltd.; Newton & Wright, Ltd.; Bruce Peebles & Co., Ltd.; and Venner Time Switches, Ltd.

Sir George Nelson and Mr. E. C. Holroyde were re-elected chairman and vice-chairman respectively for the next session.

Resistance Welding

THE annual general meeting of the Resistance Welding Machine Section of B.E.A.M.A. was held at the Holborn Restaurant, London, on 22nd April, when Mr. R. W. Ayers (managing director of Sciaky Electric Welding Machines, Ltd.), was re-elected chairman for 1948-49.

Mr. Ayers said that almost all manufacturers of resistance welding machines were members of this section of B.E.A.M.A. Order books were full for six to twelve months, and in the case of machines of larger types, still longer. Exports had shown a progressive improvement since the end of the war and they had more than doubled during the last twelve months.

This country was, with very small exceptions, self-supporting in so far as resistance welding machines were concerned, the figure for imports representing less than 0·5 per cent of the total sales. The turnover of the industry was now about £1,250,000 per annum. Export sales for the year 1946-47 showed a steady increase throughout the year. Two of the vital problems confronting the country to-day were reductions in production costs and increased exports, in both of which resistance welding could play a big part.

Electricity Boards and Workers

Conciliation Machinery Established

ARRANGEMENTS have been completed for the setting up in the nationalized electricity supply industry of three National Joint Industrial Councils covering the manual workers, technical staff, and administrative and technical grades. To celebrate the inauguration of this "conciliation machinery" a lunch was given to representatives of these Councils by the British Electricity Authority at the Café Royal, London, on 29th April.

LORD CITRINE, chairman of the B.E.A., presided and introduced MR. HUGH GAITSKELL, Minister of Fuel and Power, who congratulated the B.E.A. and the trade unions on the speed with which they had set up the new machinery. This was largely due to the traditionally happy relations already existing in the industry.

In addition to this, the Act provided for the establishment of consultative machinery which he hoped would be accomplished as soon as possible. Everybody had to be made to feel that he was "part of the show" and had an opportunity of playing that part to the full.

The functions of management and of the workers had to be defined but that would not militate against joint running of the industry.

Employees and the Public

MR. GEORGE ISAACS, Minister of Labour, said that the primary function of the national boards was to give the best service to the public but they were also designed to establish proper relationships within the nationalized industries. The opportunity was given to those people at the bottom, as well as those at the top, to help improve the service. As Minister of Labour he looked forward to the day when he would be free from worry over labour disputes as the industries would settle their own affairs. He claimed that this country's labour-management relations were better than anywhere else in the world. He was particularly pleased that provision had been made in the B.E.A. conciliation machinery for the clerical workers.

LORD CITRINE said that although the national councils had been set up the system could not function until the district machinery had also been established; he hoped that this would be done very soon. The senior officers and engineers were not yet provided for but discussions with the Associated Municipal Electrical Engineers had resulted in the formation of an organization to speak for the senior personnel and the B.E.A. was ready to discuss matters with this organization.

Machinery, however elaborate, could not function without mutual trust, goodwill and confidence. He wanted to see a happy industry with happy conditions giving good service to the public.

A great deal of attention had been given to the working out of methods of consultation and in this they had to get the full co-operation and consent of the various trade unions. They inclined to the idea of a single National Joint Advisory Council representing the B.E.A., the Area Boards and the organizations dealing with employees.

Preserving Independence

He aimed at a proper measure of independence for the Authority and Boards which should be alert and responsive to present-day needs. Public corporations were a conception of the Trades Union Congress—not the Labour Party—and trade unionists therefore had a special responsibility for ensuring that they functioned properly.

They were not a profit-making organization, nor were they a loss-making one. They had to operate on commercial principles and could not foster the belief that a public corporation would grant all requests. They were trustees for the public, giving fair treatment to the employees and to the public in proper balance.

He realized that it was hard to maintain the individual's interest in a national organization. The aim was to keep everybody in the industry informed about agreements and show them how responsive the machinery was to their needs. The machinery must not be regarded merely as a means of getting advantages. All the men on the Councils were men of responsibility and would reflect the policy of the Central Authority and the Boards.

MR. F. FOULKES, chairman of the Employees' National Committee, said that he had no doubt about the success of the machinery. He assured Sir Godfrey Ince, Secretary of the Ministry of Labour and National Service (who was present), that his conciliation department would not be troubled by the electricity supply industry. The technique of negotiation had changed entirely during the past few years. There were now no "sides"; both parties had the interest of their industry at heart.

Spark Plug Manufacture

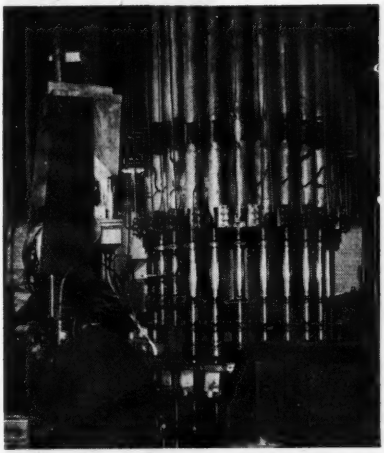
Modern Mass Production Methods

AN opportunity of inspecting the manufacture of spark plugs at the Dunstable factory of the A. C. Sphinx Spark Plug Co. (a division of General Motors, Ltd.) was accorded us last week, when among the new processes seen was the use of a multi-head automatic machine designed and developed by the company to mould the insulator forms direct from a powdered mixture, thus placing the process on a mass production basis.

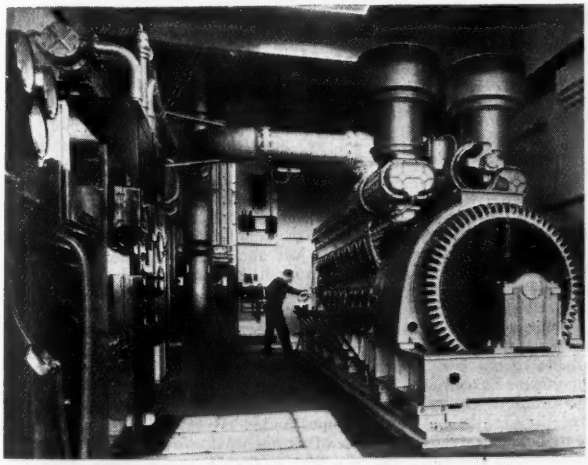
During the war the Dunstable factory produced over seven million plugs for the aircraft of the R.A.F. and Allied forces. With the experience then gained an improved plug has been developed which is now in production on a large scale and it is claimed that, as a consequence, the company has become one of the largest spark plug exporters in the British Isles.

As is probably well known, a spark plug comprises two main sections: the insulator, or body, and the metal portion which is termed the shell. In 1939 the R.A.F. used mica insulated plugs. These soon proved inadequate to the new engines as they quickly became corroded by special fuels. As a result of experimenting with alumina (aluminium-oxide) as an insulator the A.C. silver-cored alumina-insulated plug was developed.

The alumina is finely ground with bakelite powder, as a binding medium, accurately weighed and compressed into pellets of various sizes. The pellets were originally threaded on to the mandrels of a moulding machine and shaped under heat and pressure. This method was found to be too slow so a machine was designed and built, by Mr. H. Corbin, the works director, to form the insulator direct from the powdered mixture.



The Corbin machine which moulds the insulator forms direct from a powdered mixture

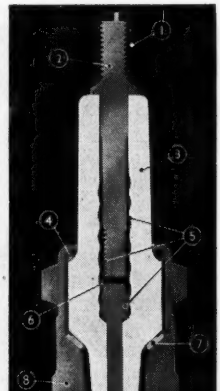


Recently installed 1,000 kW General Motors diesel generating unit

On leaving this machine the insulators are placed on the conveyor of a tunnel kiln, the temperature of which reaches 1,700 deg C. After seven hours they emerge with the bakelite binder completely burnt out, leaving a pure white insulator with a hardness approaching that of a diamond. The high temperature causes a sintering process to take place with a 20 per cent shrinkage of the moulding. The insulators are then tested at 20,000 V and sprayed with glaze.

The complete centre electrode assembly comprises three parts; the nail-head electrode (firing point), the vitreous glass-copper seal and the mild steel centre screw. The insulators are

placed in a rotary machine with the electrodes in position and the correct quantity of powdered glass and copper is deposited on the nail head to provide a conductive gas-tight seal. They then pass to a smaller assembly line where the centre screws are fitted. They next go into an electric tunnel kiln, which reaches a temperature of 900 deg C, causing the glass and copper to become plastic. As they leave the kiln a multi-head pneumatic mechanism rams the centre screws firmly into position, the molten glass and copper flowing evenly around the upper and lower halves of the electrode. Before final assembly the completed electrode unit is subjected to further visual and electrical tests.



1, Terminal; 2, terminal screw; 3, insulator; 4, upper gasket (copper); 5, locking serrations; 6, conductive glass seal; 7, lower gasket (steel); 8, shell; 9, centre electrode; 10, earth electrode

Cross sectional view of the assembled plug

The metal shells are turned out by a battery of automatic machines and pass to another machine where the side electrodes are welded into position. Another operation bends the electrodes to the correct angle, according to the type of plug.

At the top of the final assembly line the centre electrode wires are cut to the exact length by a pneumatically operated machine or a fly press. The insulator assembly is then inserted into the shell, together with the necessary gaskets and pressed firmly in position on a ring press, after which the flange is cold rolled under a pressure of five tons.

The next process, which is known as "Circo" welding, ensures a perfect gas-tight assembly. It consists of raising the shell to a cherry red heat and subjecting it to a vertical pressure of 3,500 tons/sq in. The heating is obtained by passing through the shell a current of the order of 1,000 A.

The completed plug is given a final test, washed, coated with a protective film of oil and packed by hand ready for despatch.

Improvements to plant and manufacturing methods include the recent installation of a 1,000-kW diesel generator to safeguard production during power cuts and eliminate night work introduced under the load spreading scheme. The set was manufactured by General Motors, Ltd., and has an output of 1,750 kVA at 0·8 p.f., generating at 6·6 kV, voltage regulation being provided from 5·8 to 6·6 kV. The engine is 2-stroke with sixteen 55,000 cc cylinders arranged in banks of eight to develop 1,440 b.h.p. at 750 r.p.m. This set is exactly similar to five others installed in the Luton factory of Vauxhall Motors, Ltd., which were described in the *Electrical Review* 9th January, 1948.

Army Power Station

Electricity for M.E.L.F. Headquarters

THE decision made in 1946 to transfer the G.H.Q. Middle East Land Forces from Cairo to its new location at Fayid presented something of a task for the Royal Engineers. A total of 6,000 kW was required. Equipment of the local power station was worn out so an entirely new station had to be provided. Arrangements were made to ship immediately from the United Kingdom five diesel generators together producing 2,000 kW. To supply the remaining 4,000 kW four 1,000-kW steam turbo-alternators originally intended for Russia were found at the Metrovick Works. Since no trained operators were available to run these, thirty-five men were dispatched to the School of Military Engineering, Chatham, for a twelve-week course.

The plant itself then had to be made ready for installation after lying untouched for two years. Coal-burning boilers had to be replaced by oil and the 5-ft Russian gauge of the trucks carrying the plant had to be changed to standard gauge for the Egyptian State Railways.

In the meantime at Fayid buildings had been erected to give maximum protection from sandstorms and the intense heat of the summer months. The five diesel generators had been working since February, 1947, in conjunction with the decrepit Fanara station. With the assistance of small mobile trailer-generators they were just about carrying the load of the rapidly expanding community, but it was imperative that the steam turbines should be available to meet the winter load.

The first complete steam unit was available for installation on 15th November, 1947, and steam was raised six days later. On 23rd November a violent rain storm flooded the station to a depth of 9 in. breaking newly-laid water pipes and delaying the work four days. In spite of all setbacks, however, on 5th December the first 1,000-kW steam turbo-alternator was in commission. Finally completed in March, the installation is now probably the largest of its kind in the world entirely installed and operated by the British Army.

Kelvin Lecture

Nervous System as an Electrical Instrument

THE thirty-ninth annual Kelvin Lecture was delivered at the Institution of Electrical Engineers in London last week by DR. B. H. C. MATTHEWS, reader in experimental physiology, Cambridge University.

It was entitled "The Nervous System as an Electrical Instrument," the lecturer explaining that the living cells of animals reacted to currents and also produced currents. These facts had provided methods of analysis of living cells, and in recent years it had become increasingly apparent that they also played a fundamental part in many of the reactions of the nervous system.

Most animal cells were composed largely of water. Chemical reactions occurred in them between ionized substances and many reactions in living cells were accompanied by electrical effects which appeared to be an essential part of their action, and many of the principles used appeared to be standardized throughout the animal kingdom. Increasing complexity in an animal's reactions or intelligence was associated with increasing numbers of conductors and units in its nervous system, but there was as yet little evidence of any change in the basic properties of the units.

The units of which a nervous system was built were neurones, cells having an elongated process, which was a filament of jelly called a nerve fibre. The nerve fibres formed a communicating system between sense organs and brain and muscles, but they were not simple electrical conductors. They did not themselves possess directional properties, those being determined by their end-connections.

Nerve Conduction

Since Bernstein put forward the membrane hypothesis of nerve conduction at the end of the last century, it had been generally supposed that the local current flow in the active region of a nerve was responsible for initiating the disturbance ahead and so the onward transmission of the impulse. That had since been fully confirmed, particularly by the work of Hodgkin just before the war. Thus transmission in the nervous system produced the action potential, which made it possible to tell when and how activity was proceeding in a nerve in continuity with a sense organ or the nervous system.

Usually there was a single fibre active among thousands of inactive fibres. The internal resistance of a fibre was many megohms and, as the inactive fibres provided shunt paths for the current, that reduced the observable potential to a few microvolts, about 10 appearing in a circuit of 100,000 ohms and lasting 1/1,000 second, so that the power available to be drawn from the nerve was about 10-18 watt-seconds. Occasionally it was possible to avoid that shunting and record from single fibres in air or oil and so realize large potentials, but the high internal resistance of single fibres still limited the power available.

Background noise was a fundamental barrier to the use of more sensitive recording. Physiologists had reached that barrier in 1927 and, even if it could be overcome in amplifiers, the nerve itself had a background noise of the same order as the other circuits involved.

The nervous impulse in a single fibre was a brief self-terminating activity which was incapable of graduation in magnitude. Activity was followed by refractoriness lasting about 1/1,000 second, during which no further impulse could be set up. This limited the frequency of signalling in a nerve fibre to some 500 impulses per second, a rate seldom reached.

Impulse Streams

Physical events produced a change in the sense organ often accompanied by a coincidental change of potential between the nerve fibre and the sense organ. This caused the nerve fibre to set up a stream of nerve impulses at a frequency of repetition which was a function of the magnitude of the original physical change. That very important observation had been made by Adrian and Zotterman in 1926. The relationship between the frequency of impulses set up and the magnitude of the original physical change was usually logarithmic. Generally the frequency fell although the physical stimulus was constant This phenomenon, known as adaptation, made the sense organ respond to a change in stimulus much more than to its absolute level. In fact, a sense organ partially differentiated the stimulus and adaptation acted as an automatic volume control in most sense organs. The relative sensitivity of various units present showed considerable scatter, so with an increasing stimulus more units became active in addition to the rise in frequency of response.

The electrical examination of nerve in the past thirty years had led to a clear understanding of the impulse stream going to the central nervous system and that leaving it, destined for muscles or to produce other motor activity. What must go on centrally had been inferred from correlating the "in-and-out going" impulse streams, and a vast amount of work on these lines had enabled a fairly detailed picture of the reactions of the central parts to be deduced. For instance, the analysis of involuntary reactions, such as the knee jerk, showed that impulses travelled to the spinal cord and, after a delay of some 5 milliseconds, a further train of impulses appeared in the

motor fibres going to the leg muscles. In the last twenty years an electrical clue had been found to activity in the central nervous system, which had been invaluable, as it was the only quantity accompanying central nervous activity that was immediately measurable.

Since Berger's discovery, the study of human brain potentials, electroencephalography, had become valuable not only in elucidating functions of the brain but also as a tool for the neurologist in examining abnormalities. It was widely used, for instance, in the location of tumours of the brain. At present there seemed little hope of a complete analysis of so complex an arrangement.

The arrival of a nerve impulse at a central "switching" point between fibres might produce a local long-lasting electrical change which was capable of summation with that produced by other impulses in the same or other fibres. Thus an incoming stream of impulses led to the building up of steady potential gradients which might last as long as the nerve impulse stream continued, and these gradients had temporal and special characteristics determined by the incoming impulses and the anatomy of the fibres. The current flow produced by these spread over an appreciable area and altered the state of instability of other cells. Bremer had recently shown that the synchronization of rhythmic activity in groups of neurones appeared to be effected by the current flow. In the nervous system not only were impulses propagated by electrical spread, but it appeared that the electrical gradients and currents were an essential feature in the control at the central "switching" point. The gradients formed extremely complex patterns spacially and appeared to be an electrical representation derived from the environment affecting the animal and to change their magnitude and pattern with every physical change that acted on the sense organs. Another significant function performed by electrical gradients in the nervous system might be in determining the growth of its parts during its early development.

Comparison with Physical Instruments

Finally the lecturer compared human senses with the performance of physical instruments. Recent work by Hecht and Pirenne had shown that, after half an hour in the dark, the eye could perceive a flash of light if some 100 to 200 quanta of green light reached it. Of those, only some 10 reached and were absorbed by the sensitive cells at the back of the eye. A sound energy of 10-14 watts was easily heard, so the ear did not compare unfavourably with a microphone and amplifier. In locating sounds one could make judgments of phase difference between the two ears involving appreciation intervals of the order of some 10 micro-seconds. Skin sensitivities were high, but sense of heat and cold was a very poor guide to temperature. The striking difference between human senses and physical instruments was that between detecting and measuring instruments. The senses were not "meters" but "scopes" so could not give quantitative information. They had what amounted to automatic volume control, which enabled them to function over an enormous range. It was often difficult to believe that the rich and varied effects of the senses were all conveyed in common terms as trains of nerve impulses, but that conclusion at present appeared to be inescapable.

Dr. Matthews said he wished that he could share the confidence of some physicists that the present theories of matter did not depend in part on the laws of the nerve instrument. His doubts were reinforced because the little knowledge that existed of the nerve "instrument" led one to expect certain limitations which were not unlike those that kept on recurring in the present analysis of matter and energy. It seemed to him as though man was looking through a window into a bright garden, but wherever he looked a shadowy form crossed the scene. He observed and measured the behaviour of that form, getting clearer pictures as time went on. Was it possible that this was his own reflection in the window?

Liquid Rheostats

MOST applications of liquid rheostats in recent years have been to motors of from 1,000 to 30,000 h.p., it is stated in a report prepared by the General Electric Co., Inc. For smaller motors, such rheostats face competition from other types of control despite the rating limitations of the latter, but an integral assembly including liquid rheostat, heat exchanger and circulating pump, giving the advantage of stepless and precise control, is expected to lead to wider use.

There are three basic types of liquid rheostat, in which resistance is approximately proportional to the distance between the fixed and movable electrodes and to the concentration and temperature of the sodium carbonate electrolyte. In one system the position of the electrodes is varied by manual control through the pilot-motor rheostat, but accurate speed maintenance depends upon constancy of the load torque and electrolyte temperature.

A more refined speed adjustment is obtainable when the pilot motor is energized by an amplidyne. Any divergence from the desired setting results in smooth automatic corrective movement of the electrodes. This system provides variable speed response and current-limit acceleration, and virtually eliminates speed fluctuations due to temperature drifts. A third type can maintain constant input to the motor or prevent its load exceeding a selected value. The torque motor is energized by an amplidyne, which compares the load adjustment setting of the load-control rheostat with the primary current. Variations from the setting automatically move the electrodes to maintain constant input to the motor.

British Industries Fair

Opening Functions in Birmingham and London

THE British Industries Fair was officially opened at Castle Bromwich by the Lord Mayor of Birmingham (Councillor J. C. Burman, J.P.) on Monday at a lunch given by the Fair Management Committee. Large industrial exhibitions, he said, gave a great fillip to trade and he hoped that this year's Fair might act as a springboard, the impetus from which would enable us to regain the standards of production needed to redress our financial difficulties.

The need for export markets, particularly in the hard-currency areas, was too well known for him to have to stress, but having obtained such business it was only by keeping our quality high and delivery periods short that we should

The heading illustration is a view of the Electrical Section at Castle Bromwich. Above: The stand of the British Electrical Development Association. Left: The Cable Makers' Association display

be able to maintain them. Prices too must be competitive. The Fair did show to the buyers of the world that this nation of ours had now had time to turn from war to peace production. This had been no simple task and the shortage

of materials and labour both had to be overcome. It spoke well for the initiative of our managements that this great transformation had been so quickly brought about. He was more than delighted to know that the long delivery dates that had to be quoted last year and which were a source of embarrassment to supplier and buyer alike were much easier and that reasonable times for delivery could now be offered. He had no doubt that buyers, particularly from overseas, would be greatly attracted by the design and workmanship of British goods.

Stand arranged by the *Electrical Review* at Birmingham

Sir Percy Mills, president of the Birmingham Chamber of Commerce, said that the B.I.F. was an event of great significance which demonstrated the great industrial power of this country in a way which surely would compel the confidence of the world.

General view of the Olympia Section

The King and Queen are to pay a visit to the Fair at Birmingham on 11th May.

The Duke of Gloucester was the principal speaker at the Mansion House banquet on Monday marking the opening of the Fair. His Royal Highness spoke of the interest of the Royal Family in the Fair and said that this year the King and Queen would pay three visits; Queen Mary had attended every Fair since the first of the series.

He welcomed visitors from overseas and told them that they could now rely on earlier and more certain delivery dates. We had more to offer and a greater variety was available.

At Earls Court and Olympia, where the lighter industries are represented, 2,309 exhibitors occupy 549,631 sq ft of floor space. Ample proof is given that Britain has not lost her skill, inventiveness or adaptability. One feature is what is probably the finest range of electric clocks in the world.

The exhibition of scientific instruments at Olympia this year was organized, as was the case with the 1947 Fair, with the co-operation of the Scientific Instrument Manufacturers' Association of Great Britain and it provides a convenient conspectus of the products of the whole scientific instrument industry. The central exhibit epitomizes television and the subjects of cinematographic films passing through a machine in the centre of the exhibit reappear as displays on 20-in. cathode ray tubes at vantage points in the instruments section.

Instruments are shown which provide the means of navigation in the air and on the sea, of bringing to light the secrets of the sea bed, of surveying on land and geophysical investigation upon the earth. Among the many other instruments exhibited are those for the measurement of gas and liquid flow, the analyses of flue gases, the indication of temperatures and the recording of pressures, which are all essential to the efficient carrying out of industrial processes.

PERSONAL and SOCIAL

News of Men and Women of the Industry

FOR the third successive year **Mr. F. W. Purse,** M.I.E.E., M.I.MECH.E., has been elected president of the Building Industries National Council.

Mr. W. E. Ballard, A.M.I.E.E., F.I.E.S., late of the General Electric Co., has joined the staff of Concrete Utilities, Ltd., as Northern Area sales manager and illuminating engineer, operating from their Kirkby (near Liverpool) works and branch office. Mr. Ballard received his electrical training at the Polytechnic, Regent Street, London, and Salford Royal Technical College. During the war he served in the Royal Air Force. A staff presentation was made to Mr. Ballard on leaving the General Electric Company.

Mr. W. E. Ballard

Mr. S. R. Urquhart, A.M.I.E.E., A.M.I.MECH.E., of Prestwick, has been appointed power station superintendent to the North of Scotland Hydro-Electric Board. Mr. Urquhart was educated at Dunfermline High School and received his technical education at Heriot Watt College of Engineering, Edinburgh, and Lauder Technical College, Dunfermline. After marine experience he became assistant power station superintendent with the Madras Electric Supply Corporation, Ltd., and later was for sixteen years chief generation engineer with the Municipal Commissioners of Singapore.

Mr. H. E. Walker, managing director of Walker Bros. (Electrical Engineers), Ltd., of Birmingham, has relinquished the position of electrical engineer to the City of Birmingham Justices, which he has held in a part-time capacity for over thirty-six years. In a statement the chairman of the Birmingham Public Entertainments Committee of the Justices pays tribute to services rendered by Mr. Walker, who was appointed when the cinema industry was in its infancy and has seen the erection of and supervised the electrical installations at almost every cinema in the city, as well as other important buildings coming under the control of the Justices. Modern conditions call for a continuous and systematic inspection of the electrical arrangements in such buildings, and the Justices have decided that the work involved demands the employment of a whole-time officer. They have therefore appointed **Mr. G. E. McLean** as full-time electrical engineer to act as an assistant to the Justices' surveyor in connection with the oversight of the electrical installations in all places of public entertainment.

Mr. F. N. Rendell Baker, who recently retired from the position of chief engineer and manager of the Croydon Electricity Department, has been retained to advise the Corporation on street-lighting matters at a fee of £500 per annum. Mr. Rendell Baker is continuing to act as consultant for the new Croydon power station.

Mr. H. de A. Donisthorpe is president of the Radio Industries Club for the ensuing year, with **Mr. A. J. Dew** as vice-president. The chairman is **Mr. J. H. Williams** and the vice-chairman **Mr. A. J. P. Hytch.**

Major C. R. Dibben, O.B.E., who since 1919 has been Midland secretary of the F.B.I., is retiring from that office in order to devote more time to other industrial interests. His place will be taken on 1st September by **Mr. I. Earle,** who joined the F.B.I. in 1938 as assistant to Major Dibben.

Mr. Bernard G. Drummond, jun., T.D., A.M.I.E.E., until recently sales manager to the Isle of Wight Electric Light & Power Co., has been appointed regional manager for South Africa for the American Brake Shoe Co. Mr. Drummond, who was demobilized in 1945 as Lieutenant Colonel, R.E.M.E., will arrive in Johannesburg in June.

The British Refrigeration Association announces that **Mr. W. S. Douglas,** B.SC., has accepted office as an additional vice-president of the Association for the year 1948.

Mr. S. Erickson has joined Burndept, Ltd., as their chief design and development engineer. He was formerly with the G.E.C. Telephone and Radio Works, and for a short time was chief draughtsman with Morphy-Richards, Ltd.

Dr. Frederick Lloyd-Kessel, controlling G.P.U., Ltd., and associated companies, has been appointed managing director of the recently-formed Cleanette Appliances, Ltd., which has a working agreement with H. Fisher (Oldham), Ltd., in respect of production.

Mr. J. A. Smith, of the Plessey Co., Ltd., has been elected chairman, and **Mr. C. H. Davis,** of the Reliance Electrical Wire Co., Ltd., vice-chairman of the Radio Component Manufacturers' Federation for 1948-49. The treasurer is **Mr. H. V. Slade.**

At a luncheon held at the Black Boy Hotel, Nottingham, on 22nd April, to wind up the Midland Area Joint Committee of Bulk Supply Takers and the Power Companies, a presentation of an antique silver salver was made to **Mr. J. B. Feltham,** of Long Eaton, who has been the honorary secretary for nearly fifteen years.

The presentation was made by Mr. C. R. King, chairman of the East Midlands Electricity Board.

Southport Electricity Committee recently presented to **Mr. W. T. Gann,** borough electrical engineer, a card table and four chairs upon his transfer to the British Electricity Authority.

In recognition of their long service to **Johnson & Phillips, Ltd.,** Mr. T. McKiernan and Mr. J. C. Day, who have completed over fifty years' service at the Charlton works, have each been presented with an inscribed silver cigarette box.

In connection with the E.I.B.A. national golf competition, the Manchester Area Organizing Committee has now been launched and had its first meeting on 26th April. The chairman is **Mr. G. F. Sills,** of the English Electric Co., Ltd., vice-chairman Mr. O. M. Robson, of Ferranti, Ltd., secretary Mr. W. R. Gibb of W. T. Glover & Co., Ltd., assistant secretary Mr. B. Windle of British Insulated Callender's Cables, Ltd., and treasurer Mr. Alan H. Owen, of Cryselco, Ltd.

The Mersey and North Wales Centre of the Institution of Electrical Engineers is holding a golf competition in aid of the I.E.E. Benevolent Fund on 3rd June at the Southport and Ainsdale Golf Club. The tournament will be a full-day event and will include the G. P. Dennis Trophy. A supper and the presentation of prizes will take place at the Club House at 8 p.m. Applications for entry forms should be made to Mr. T. Coates, organizing secretary, Electricity House, Newgate Street, Chester.

On 14th April the **General Electric Co., Ltd.,** held its annual dance for members of the staff and their friends at the Lyceum Theatre. Among the 800 guests were Mr. Leslie Gamage, vice-chairman of the G.E.C., and the Hon. Mrs. Leslie Gamage who presented the prizes.

On Friday and Saturday last week at King George's Hall, London, W.C.1, the **Johnson Matthey Dramatic Society** presented a farce, "See How They Run," by Philip King. As with all plays of this kind the humour is dependent on action rather than the spoken word and the many hilarious situations which this comedy provides were handled with great gusto by every member of the cast. The hall was well filled each evening and the players were accorded an enthusiastic reception.

Obituary

Mr. F. S. Robertson.—The death occurred on 2nd May, at the age of seventy-two, of Mr. Frederick Steell Robertson, A.K.C., M.I.E.E. Mr. Robertson was educated at Dulwich College and then went to King's College, London, as a student, remaining for a further year as demonstrator in mechanical engineering. After two years with Siemens Bros., Woolwich, he joined the staff of King's College (in 1900) and retired in 1937 as senior lecturer in electrical engineering.

Mr. Arthur J. Bousfield, A.M.I.E.E., who has died at Westerham at the age of sixty-eight, was associated with the Ford Factory, Dagenham, from its beginning until his death. He was in charge of the 60,000-kW power plant until three years ago and he continued to serve the company as a consultant. He was a former chief engineer and manager of the Isle of Thanet tramway system and chief engineer of the Chatham tramways.

Mrs. R. J. Hatton.—The death, on 30th April, is reported of Mrs. Annie Hatton, widow of Mr. R. J. Hatton, M.INST.C.E., M.I.E.E., M.I.MECH.E., who was a director of W. T. Henley's Telegraph Works Co., Ltd.

Wills.—The second **Earl of Lytton,** who was chairman of Central London Electricity, Ltd., and London Associated Electricity Undertakings, left unsettled estate of £77,948 gross (net £65,717).

Mr. J. W. I. Stephen, late of British Insulated Cables, Ltd., left personal estate in England and Northern Ireland valued at £7,752.

Mr. F. A. Pucknell, superintendent of the large electrical machine department of the Metropolitan-Vickers Electrical Co., Ltd., left £14,157 gross (£13,960 net value).

Mr. W. H. Gatley, of Gatley & Co., electrical engineers and contractors, Todmorden, left £1,193 (£1,089 net value).

Lt. Col. A. A. Evans, formerly chief engineer in the Palestine Posts and Telegraphs Department, left £992 (£912 net).

Consultative Councils

REGULATIONS have been made by the Minister of Fuel and Power governing the appointment and procedure of the Consultative Councils which are to be set up in the fourteen Electricity Areas. (Electricity (Consultative Councils) (Areas) Regulations, 1948; S.I. 1948 No. 898; H.M. Stationery Office, 1d.).

These provide, *inter alia,* that members shall be appointed for a term not exceeding five years but should be eligible for re-appointment. The chairman and deputy chairman are to be appointed by the Minister.

A local authority representative will cease to be a member if he is no longer a member of the authority and a member may be removed by the Minister if he is absent from meetings of the Council for six months or is unfit to continue as a member or is incapable of performing his duties.

Meetings of a Council shall be as frequent as is necessary for the proper discharge of its duties and there must not be a longer interval than three months between meetings. Representations made by consumers or prospective consumers, or matters referred to a Council by the Area Board, must be considered as soon as practicable and in any event within three months after the representation is made.

Electricity Appointments

Further Divisional and Board Officials

MR. A. R. COOPER, divisional controller, has sent us the following list of appointments in the **Merseyside and North Wales Division**:—*Chief generation engineer (operation):* Mr. R. L. Batley, A.M.I.MECH.E. (superintendent engineer of generation, Liverpool E.S.D. Dept.). *Senior assistant engineers (efficiency):* Messrs. D. F. Grant, A.M.I.E.E. (deputy borough electrical engineer, Southport) and H. Berry, M.ENG., A.M.I.MECH.E., A.M.I.E.E. (assistant superintendent engineer of generation, Liverpool). *Mechanical maintenance engineer:* Mr. W. J. Norrie (mechanical maintenance engineer, Swansea). *Second assistant station operation engineer:* Mr. S. I. Ainsworth, B.SC. (ENG.) (assistant efficiency engineer, Fulham). *Second assistant engineer (system liaison):* Mr. G. W. Garth (assistant control engineer, Central England Area, C.E.B.). *Generation engineers (construction):* Messrs. F. H. S. Brown, B.SC., A.M.I.MECH.E., A.M.I.E.E. (chief technical engineer, Liverpool) and A. N. Duffett, B.ENG., A.M.I.E.E., A.M.INST.C.E. (deputy borough electrical engineer, Blackburn). *Resident engineers (construction):* Bromborough: Mr. J. H. Osborn, B.SC. (ENG.), A.M.INST.C.E., A.M.I.MECH.E., A.M.I.E.E. (deputy electrical engineer, Wallasey); St. Helens: Mr. J. R. Taylor, A.M.I.E.E., A.M.I.I.A., M.I.F.(deputy electrical engineer, St. Helens); Warrington: Mr. N. A. Steel (site engineer, B.E.A. Eastern Division). *Transmission engineer:* Mr. J. A. Spence, B.SC., M.I.E.E., A.M.I.MECH.E. (assistant engineer, Kennedy & Donkin). *Senior assistant transmission engineer*, Mr. T. B. Airey, ASSOCIATE I.E.E. (section engineer, C.E.B.). *Technical engineer*, Mr. E. A. Burton, A.M.I.E.E. (technical assistant, research laboratory, C.E.B.). *Secretary:* Mr. E. Butterworth, A.S.A.A. (clerk and treasurer, Stalybridge, etc., Board). *Personal assistant to controller:* Mr. J. G. N. Rutter (administrative assistant, W.M.J.E.A.). *Section head (secretarial):* Mr. W. Hughes (commercial assistant, Warrington). *Assistant purchasing officer:* Mr. J. D. Stewart (purchasing assistant, Liverpool). *Accountant:* Mr. A. H. Campbell, C.A. (senior assistant accountant, Y.E.P. Co.). *Senior assistant accountant:* Mr. N. Wells, A.C.I.S. (deputy clerk and treasurer, Stalybridge. etc., Board). *Section head (accountancy):* Mr. F. Frost (senior accountancy assistant, Borough Treasurer's Department, Rotherham).

In addition to the appointments already made, the **Merseyside and North Wales Electricity Board** announces the following:—*Deputy secretary*, Mr. M. M. Parker; *establishment officer*, Mr. E. A. E. Colter; *assistant engineers*, Messrs. F. J. Brown, B.SC., D.P.A., A.M.I.E.E., G. G. Burford, M.I.E.E. and J. C. Cowan, B.SC., A.M.I.E.E.; *assistant commercial officers*, Messrs. W. B. Parkinson, B.SC., and S. G. Roper; *assistant accountants*, Messrs. H. Strange, A.I.M.T.A., and A. N. Todd. Sub-area officers:—No. 1—*Engineer*, Mr. E. L. Morland, M.I.E.E.; *secretary*, Mr. P. C. Winter, LL.M.; *accountant*, Mr. A. M. Riley, A.I.M.T.A.; *commercial officer*, Mr. W. J. Forster, M.I.E.E., A.M.I.MECH.E. No. 2—*Engineer*, Mr. B. Dixon; *secretary*, Mr. S. Dale; *accountant*, Mr. M. Thomas, A.C.A.; *commercial officer*, Mr. H. Breckell, A.M.I.E.E. No. 3—*Manager*, Mr. T. Coates, M.ENG., M.I.E.E., M.I.MECH.E. (sub-area liaison officer acting temporarily in this capacity); *engineer*, Mr. J. V. Lironi, M.I.E.E.; *secretary*, Mr. R. D. Thomas, D.P.A., A.C.I.S.; *accountant*, Mr. R. Bennett, O.B.E., F.I.M.T.A., A.S.A.A.; *commercial officer*, Mr. S. C. Harling, M.I.E.E., A.M.I.MECH.E., F.INST.P. No. 4—. *Engineer*, Mr. A. N. Mansfield, M.I.E.E.; *secretary*, Mr. W. J. Rowland, F.C.C.S.; *accountant* Mr. H. W. Povey, A.S.A.A., A.C.I.S., A.I.M.T.A.; *commercial officer*, Mr. T. R. Smith, A.M.I.E.E.

Among the further appointments made by the **North Eastern Electricity Board** are the following: *Section heads, chief engineer's department:* Operation and maintenance, Mr. H. Esther, B.ENG., A.M.I.E.E.; construction, Mr. W. S. Ramsdale, A.M.I.E.E.; planning and development, Mr. J. N. G. Chalk; meters, Mr. J. W. Faulkner, B.SC., M.I.E.E. *Section heads, chief commercial officer's department:* Mining, Mr. N. S. Walker; statistical, Mr. W. A. Carne, B.SC., M.I.E.E., F.S.S.; industrial, Mr. R. M. Muckart; commercial and domestic, Mr. E. J. Parnall, T.D., B.SC., M.I.E.E. *Tyne Sub-Area:* Engineer, Mr. E. E. Dunn, M.I.E.E.; commercial officer, Mr. J. M. Smillie. *Wear Sub-Area:* engineer, Mr. E. G. Swangren, A.M.I.E.E.; commercial officer, Mr. W. D. Lovell, M.I.E.E., A.M.I.MECH.E. *Tees Sub-Area:* Engineer, Mr. E. G. Grubb, B.SC., A.M.I.E.E.; commercial officer, Mr. C. E. Traylen. *Harrogate Sub-Area:* Manager designate (to succeed Mr. A. Kelso on 30th June), Mr. W. K. Fleming, M.I.E.E.; commercial officer, Mr. H. Ainsworth, A.M.I.E.E., A.M.I.I.A.; accountant, Mr. F. R. Gadd, A.I.M.T.A.; secretary, Mr. J. S. T. Price, A.I.A.C., A.M.I.I.A. *York Sub-Area:* Engineer, Mr. T. Duerden, M.I.E.E., A.M.I.MECH.E.; commercial officer, Mr. C. Wilkins, A.M.I.E.E.; accountant, Mr. W. J. Dawson, F.C.R.A.; secretary, Mr. H. Ambler.

The **British Electricity Authority** announces the appointment of Mr. A. Haywood as contracts manager in charge of revenue purchases. Mr. Haywood has been with the Marketing Division of the National Coal Board, and before the formation of that body he was coal supplies officer in South Wales.

Mr. G. B. Partridge, a member of the West Midlands J.E.A., has been appointed a member of the **Midlands Electricity Board.**

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

Fluorescent-Lamp Fittings

WE wish to draw the attention of the trade to what appears to us to be a most unfortunate fact in the design of fluorescent fittings. We refer to the positioning of the thermal switches under the lamp or lamps.

A normal failure in a fluorescent fitting is concerned either with the lamp or with the thermal switch. The failure may involve a certain amount of experiment with various switches and various lamps, and to have the switch under the lamp is most inconvenient, and has the effect of doubling the labour cost of day-to-day maintenance.

On two-lamp fittings, the situation is even worse, and with the introduction of the 2-ft 40-W lamps in series, will be worse still, since the failure of one lamp will involve the maintenance electrician (on top of his steps) in a process of elimination instead of working in an objective and proper manner.

One further point concerns the manipulation of the thermal switch; no one has yet realized how awkward this can be when the fitting is mounted on a 10-ft ceiling and operated by a horny-handed individual with fingers slightly dirty and even slightly greasy. In our opinion, these points are the terms of reference of design, and to ignore them is to ignore the problem.

London, E.C.4. MORTIMER, GALL & CO., LTD.
J. Mortimer Hawkins, *Managing Director.*

Electricity in the Navy

I SHOULD like to express appreciation of the article by Mr. R. C. Gordon on the electrical equipment in H.M.S. *Springtide*, which appeared in your issue of 16th April. As an ex-minesweeping officer, however, I must express surprise at the novel explanation given by the author for the term "Double L."

This sweep, the name of which was generally understood to refer to "Double Longitudinal," comprised a long and a short "tail" of buoyant cable partially lashed together with a bare copper electrode at the outboard end of each. The electrodes were supported by floats, but even if they had sunk by virtue of their weight as suggested, this could hardly be said to constitute an "L" in view of their very short length as compared to the quarter of a mile or so of buoyant cable in the tail itself.

Birchgrove, Cardiff. C. F. NOCK, *Commander.*

Battery Sulphation

ELECTRO-CHEMICAL action during the discharge of a lead-acid battery depends essentially on the combination of the sulphuric acid electrolyte and the active material in the plates. A certain amount of lead sulphate, the Chloride Electrical Storage Co., Ltd., states, is beneficial in a healthy positive plate for cementation, as without it the active material might be too soft.

As the degree of sulphation increases, the nature of the lead sulphate changes from an uncrystallized to a crystalline state, and a crust is formed over the active material, which being a poor conductor is not readily responsive to a charging current. A badly sulphated plate has a white surface deposit, quite distinct in appearance from a hydrated plate which has a soft creamy-looking surface.

Abnormal sulphation occurs only if a battery is under-charged or left without a charge for a prolonged period, and a healthy condition can usually be restored. The electrolyte should be replaced with distilled water and the battery given a prolonged charge. When the specific gravity of the electrolyte, of which note should be taken at intervals, has risen to from 1,100 to 1,150, the charge should be stopped. The battery should next be refilled with distilled water and recharged until the electrolyte attains a maximum maintained specific gravity. The electrolyte should then be replaced by pure sulphuric acid of 1,250 sp. g.

Canadian International Trade Fair

OVER 200 United Kingdom firms will be exhibiting at the Canadian International Trade Fair in Toronto from 31st May to 12th June. Apart from those firms which will be displaying their products directly there will be other British concerns whose Canadian agents will undertake to exhibit on their account. Many have joined forces to stage collective exhibits in six groups. The total number of exhibits from more than thirty participating countries exceeds 1,500.

E.D.A. Council

NATIONALIZATION of the electricity supply industry has naturally necessitated the reconstruction of the Council of the British Electrical Development Association. This reconstruction which provides for the representation of the British Electricity Authority, the Area Electricity Boards and the North of Scotland Hydro-Electric Board is now complete. The new chairman is Mr. J. Eccles, chairman of the Merseyside and North Wales Electricity Board, and the vice-chairman is Mr. R. A. S. Thwaites, deputy-chairman of the North Western Board. Other members of the Council are as follows:—

Representing the B.E.A.: Mr. J. Hacking, Lt. Col. E. H. E. Woodward, Mr. H. F. Carpenter, Mr. E. R. Wilkinson, Mr. W. N. C. Clinch and Mr. G. A. Vowles.

Representing Area Electricity Boards: London, Mr. H. J. Randall; South Eastern, Mr. N. Elliott; Southern, Mr. H. Nimmo; South Western, Mr. S. F. Steward; Eastern, Mr. C. T. Melling; East Midlands, Mr. John Mould; Midlands, Mr. D. H. Kendon; South Wales, Mr. L. Howles; Yorkshire, Mr. W. M. Lapper; North Eastern, Mr. H. H. Mullens; South East Scotland, Mr. W. S. Sawtell; South West Scotland, Mr. J. S. Pickles.

Representing North of Scotland Hydro-Electric Board, Mr. W. D. D. Fenton.

Representing Northern Ireland undertakings, Mr. W. J. McC. Girvan.

Examination of Welds

THE radiography of welds is the subject of a paper contributed by MR. R. F. BISHOP (Whessoe Co., Ltd.) to the Institute of Marine Engineers.

The author first deals briefly with the selection of X-ray outfits for various duties, more particularly for examinations in factories and on constructional sites. Thus for the majority of light alloy work and mild steel less than 1·25 in. (3·17 cm) thick a 150-kV set is most suitable. For steel of from 1·5 in. (3·81 cm) to 2·5 in. (6·35 cm) thick 200 kV is necessary ; 400 kV will suffice for 4 in. (10·16 cm) and 1,000 kV for 8 in. (20·32 cm) thickness of steel. In the million-volt American G.E. set, the X-ray tube is situated at the centre of a resonance type transformer, the whole being insulated with "Freon" gas under pressure. Only two of these sets are in operation in this country.

The particular spheres of usefulness of radium, or radon, instead of X-rays are mentioned, but the major part of the paper contains a detailed account of the interpretation of weld radiographs with descriptions of types of faults revealed thereby and methods of determining the depth of faults.

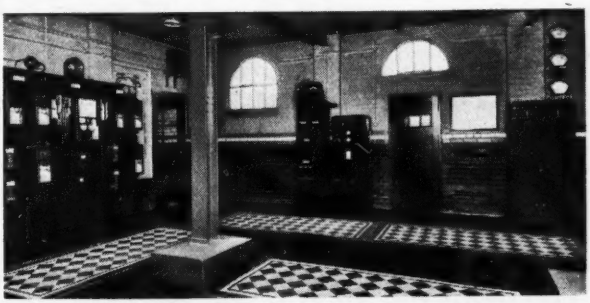
Street Lighting Control

ON 29th April, at the St. Annes electricity works, the Mayor of Lytham St. Annes (Councillor J. R. Butterfield, J.P.) officially inaugurated the "Rythmatic" (Automatic Telephone & Electric Co.) street-lighting control system and the occasion also marked the change-over from gas to electric lighting on the Lytham promenade. Only a few remote positions and several minor roads remain to be converted.

In the borough of Lytham St. Annes there are about 2,500 public lamps illuminating road surfaces totalling 76 miles in length, 30 illuminated passenger shelters, and 12 public conveniences. The average burning time per annum is just under 2,000 hours and the total daily public lighting load is just over 300 kW divided into four groups which can be utilized all together or separately.

The control equipment installed in the St. David's Road station will provide signals in excess of those required for street lighting control. Pre-selected loads of low priority such as water heaters can be dispensed with for the brief, though dangerous, excessive load period.

The signal current is provided by a motor-alternator at St. David's Road and is there superimposed on the power network. Each relay has an electrical filter which rejects the normal supply at 240 V, 50 cycles and accepts the signal supply at 2 V, 1,500 cycles. This one frequency can be used for eight different signals.



"Rythmatic" control equipment at Lytham St. Annes

The signals are initiated from a control panel which is fitted with two six-position selector switches and one "transmit" button. The controller moves the selector switch to the

desired position, presses the " transmit " button and the signal is automatically transmitted. Each signal position has an associated pilot lamp controlled by a relay tuned to the same rhythm as those it represents on the network.

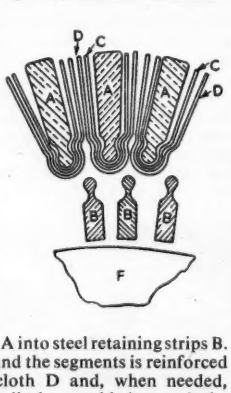
Heavy-duty Cartridge Fuses

IN a paper presented to the London Students' Section of the Institution of Electrical Engineers, Mr. K. C. Pounds dealt with the use of heavy-duty cartridge fuses.

After discussing barrels, elements and filler materials the author proceeded to such operational requirements as methods of reducing heating on overloads and of increasing the time-lag. He explained the meaning of " prospective current," on which duty categories were based; then described the short-circuit operation of fuses of this kind and stated the reasons which rendered them suitable for protecting cables, backing-up motor circuits, for safeguarding domestic installations and for discriminative operation. Manufacturers' curves were stated to be of little use for determining discrimination at very heavy current values.

Commutator Improvement

A NEW way of constructing commutators, due to Mr. A. A. Pollock, director and chief mechanical engineer, British Thomson-Houston Co., Ltd., avoids deflection by supporting each bar throughout its length in a manner that leaves the copper free to expand axially.



Exploded view of portion of cross-section of commutator

Adjacent segments are interlocked, to prevent " high bars " rising in service, by fitting the copper segments A into steel retaining strips B. Mica C moulded round the segments is reinforced with treated glass cloth D and, when needed, micanite can be similarly moulded round the top portion of the anchor strips so as to increase the insulation to earth. The steel retaining strips B are welded at intervals along their length to steel discs F, the spacing of the latter depending upon the total centrifugal force.

Thus when properly designed and the insulation is really consolidated the commutator is arch-bound and each segment positively locked into position along its entire length. Certain of the steel discs are machined to a light shrink fit on the com-shell. The discs are so proportioned that they may deflect as diaphragms when they become hot in service, without hindering the small differential expansion between copper and steel.

To seal the interior and position the copper axially, an insulated flange is bolted to each end, to the first disc at the back end and to the shell at the front. These heads can also deflect as diaphragms to allow for expansion.

A commutator constructed in this way must remain quite true circumferentially, so that individual bars do not tend to rise. The stresses are much less than those in a similar commutator of the usual V-ring type.

The building of the new type, which is fully described in the March-April issue of " BTH Activities," is now going into production after eighteen months" tests on a prototype fitted to a 1,250-kW machine running at 625/1,400 r.p.m.

Davy-Faraday Exhibition in Paris

AN exhibition of surviving relics illustrative of the lives and work of Davy and Faraday is being staged at the Palais de la Decouverte, under the ægis of the University of Paris, in May and June.

The Royal Institution is lending some of the original apparatus used by Faraday in his experiments and pieces of his laboratory and office equipment, while the Institution of Electrical Engineers has lent a number of Faraday manuscripts, including his commonplace book, chemical notes, a number of letters and a full-sized reproduction of the statue of Faraday. As reported in our issue of 16th April, the General Post Office has sent the working section of an automatic telephone exchange recently shown at Radiolympia.

With the collaboration of the British Council, a number of lectures are to be delivered by British scientists and engineers on the life and work of Davy and Faraday. Mr. J. F. Shipley has been deputed by the President of the I.E.E. to attend the opening of the exhibition as his representative and to deliver a lecture on the industrial consequences of Michael Faraday's discoveries.

I.E.E. Annual Report and Accounts

COPIES of the annual report of the Council of the Institution of Electrical Engineers for the session 1947-48 and of the accounts for the year ended 31st December, 1947, to be presented at the annual general meeting on 13th May, can now be obtained by members of the Institution on application to the secretary.

Television Society Midland Centre

THE Television Society has formed a Midland Centre and the inaugural meeting was held last month at the University, Birmingham. The lecture secretary is Dr. W. Summer, 169, Mary Vale Road, Bournville, Birmingham, 30. Meetings will be held on the first Wednesday in each month, except in July and August.

COMMERCE and INDUSTRY

E.T.U. Conference.

THE annual conference of the Electrical Trades Union is to be held at Great Yarmouth next week. At a luncheon on 14th May Mr. Hugh Gaitskell, Minister of Fuel and Power, will be the principal guest and during the week the conference is to be addressed by Mr. E. W. Bussey, member of the British Electricity Authority, who was formerly general secretary of the Union.

Coal Mines (Lighting) Regulations

It is announced that in accordance with Regulations No. 10 (2) (*d*) and No. 11 of the Coal Mines (Lighting) General Regulations, 1947, the following classes of apparatus are now deemed to be of a type approved by the Minister of Fuel and Power :—

1. *Regulation* 10 (2) (*d*).—Any apparatus that complies with B.S. 889/1947 with type A glassware when duly certified in respect of its flameproof enclosure.

2. *Regulation* 11.—Electric lights (including signalling apparatus) which are fittings or accessories to machinery or electric plant:—(*a*) if fixed in or form a constructive part of apparatus which has been duly certified, or is intrinsically safe; (*b*) if they form a constructive part of machinery which is covered by a specific approval, the part which constitutes lighting equipment having been certified in respect of its flameproof enclosure.

S.E. Scotland Board Refused Offices

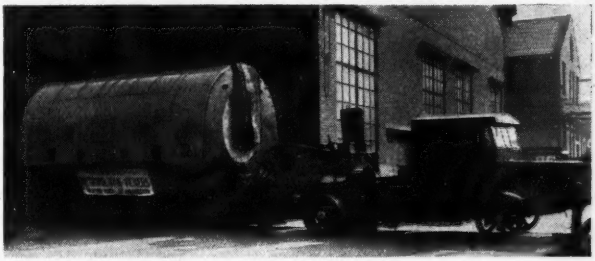
The Edinburgh Housing Committee recently rejected an application by the South-East Scotland Electricity Board for the use as offices of premises at present occupied by a private hotel. A councillor said a firm stand had to be taken against this encroachment on housing by the nationalized industries, and another maintained that it was political prejudice that caused antagonism to the request. The Committee referred the general question to the Town Council.

Diesel-Electric Auxiliaries for Tankers

Associated British Oil Engines, Ltd., has received from shipbuilders orders for twenty-six sets of diesel-electric auxiliaries driven by engines built by Mirrlees, Bickerton & Day, Ltd., for installation in ships being constructed for the British Tanker Co., Ltd. The Wallsend Slipway & Engineering Co., Ltd., has ordered four Mirrlees six-cylinder engines rated at 270 b.h.p. at 500 r.p.m. driving 150-kW alternators; Hawthorne Leslie & Co., Ltd., will receive two similar sets; William Doxford & Co., Ltd., fourteen three-cylinder engines rated at 135 b.h.p. at 500 r.p.m. driving 75-kW alternators; Swan Hunter & Wigham Richardson, Ltd., four similar sets; and J. G. Kincaid & Co., Ltd., two similar sets.

Large Stator for Portishead

The accompanying picture shows a 50,000-kW turbo-alternator stator, weighing ninety-two tons, leaving the Trafford Park Works, Manchester, of the Metropolitan-Vickers Electrical Co., Ltd., on its six-day journey by road to the Portishead power station. This is the first set to be dispatched by the company since the electricity supply undertakings were vested in British Electricity Authority, and it will increase the capacity of the Portishead station to 240,000 kW.



Metrovick turbo-alternator stator en route to Portishead power station

Lamp Bulb Project.

Manufacture of Glass Bulbs

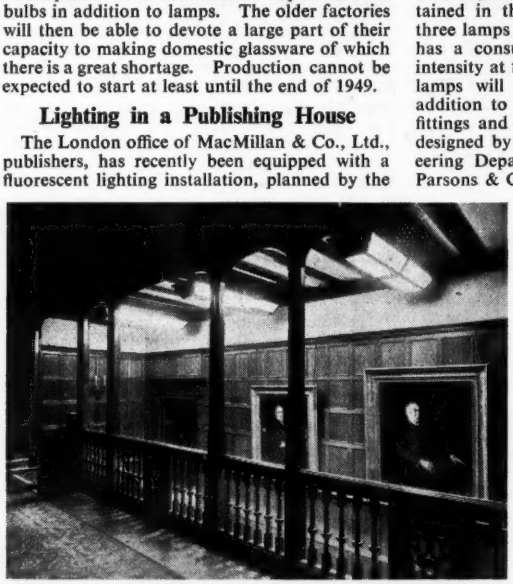
The registration is recorded in our "New Companies" section of Glass Bulbs, Ltd., the million-pound capital of which is to be subscribed equally by the General Electric Co., Ltd., and the British Thomson-Houston Co., Ltd. The company plans to build and bring into operation as quickly as possible a new factory for which a site has already been chosen at Harworth, near Doncaster, where two "Ribbon" machines of the type developed by the Corning Glass Co. (U.S.A.) will eventually go into operation with a potential capacity of over 400 million lamp and valve bulbs a year.

The policy of the new company is to make all types of these components freely available to all manufacturers in the lamp and valve fields.

The new special-purpose factory will produce bulbs more economically and will allow for the development of a considerable export trade in bulbs in addition to lamps. The older factories will then be able to devote a large part of their capacity to making domestic glassware of which there is a great shortage. Production cannot be expected to start at least until the end of 1949.

Lighting in a Publishing House

The London office of MacMillan & Co., Ltd., publishers, has recently been equipped with a fluorescent lighting installation, planned by the British Thomson-Houston Co. The new scheme, which serves the main entrance vestibule, ante showroom and staircase, is designed to produce an effect in keeping with the dignity of this 100-year-old building whilst providing adequate, well diffused illumination for the inspection of the book displays. Mazda 80-W "Warm-White" fluorescent lamps are used in specially designed fittings constructed in wood, carved and stained to tone with the existing oak panelling of the rooms concerned.



Fluorescent lighting in MacMillans London office

Foundry Lighting

One of the foundries at C. A. Parson's Heavy Engineering Works, Newcastle-on-Tyne, is being lighted by "Osram" cold cathode fluorescent lamps. One of the factors which influenced the decision to use these lamps was the necessity for an installation which would require as little maintenance as possible in view of the fact that the mounting height is 40 ft. The Osram "daylight" lamps have a life of over 10,000 hours. The auxiliary gear is contained in the units, each of which comprises three lamps fitted in an enamelled reflector and has a consumption of 250 W. The average intensity at floor level throughout the life of the lamps will be 12-15 lumens per sq ft. In addition to the lamps, the G.E.C. supplied all fittings and auxiliary gear and the scheme was designed by the company's Illuminating Engineering Department in conjunction with C. A. Parsons & Co., Ltd. The G.E.C. is also undertaking a similar scheme for two assembly bays, which, together with the foundry, will bring the total number of units used to approximately 500.

One of the foundries of C. A. Parsons & Co. lighted by fluorescent lamps

Commercial Travellers' Benevolent Institution

The half-yearly Court of Governors of the Commercial Travellers' Benevolent Institution will take place at the London Offices, 4b, Frederick's Place, Old Jewry, London, E.C.2, on 26th June.

Research Developments

The following technical reports have recently been published by the British Electrical and Allied Industries Research Association:—F/T168, "Electrolysis and Bond Strength of Reinforced Concrete," by W. L. Gent and G. Mole, 14s. net; increase in bond strength was found with d.c. and was associated with formation of calcium carbonate on cathodic reinforcement. G/T204, "Prospective Current-Arc Energy Relationship in Cartridge Fuses," by H. W. Baxter and M. T. Cree, 3s.; with direct currents only slightly above fusing values, a fuse may be destroyed; with a.c. the effect is

much less. L/T181, "Spontaneous Capacitance Fluctuations in Silvered Ceramic and Silvered Mica Capacitors," by H. F. Church, 6s.: caused by non-uniformity of silver deposit which forms the electrodes. M/T94, "A.C. Harmonics due to Traction System Supplies by Mercury Arc Rectifier," by A. Butterworth and E. E. Hutchings, 5s.; effect on temperature rise of rotor of 20,000-kVA turbo-alternator having traction as almost entire load.

London Electricity Board's Headquarters

The headquarters of the London Electricity Board are now at 46-47, New Broad Street, E.C.2 (telephone: London Wall 1280), to which all correspondence should be addressed for all departments except that of the chief engineer. Correspondence for the chief engineer should be forwarded to 60, St. Martin's Lane, W.C.2 (telephone: Temple Bar 9134).

Imports into Pakistan

The Pakistan Government has made a number of additions to the list of goods from the United Kingdom and other Empire countries under Open Licence No. IV which applies to shipments made on or before 30th June next. These additions include electric lamps (except torch bulbs), domestic refrigerators and parts, radio receiving apparatus and parts, electro-medical apparatus, and tramcars and parts.

N.I.B. Appeal

The National Institute for the Blind, 20, Great Portland Street, London, W.1, has issued a booklet entitled "Skilled Hands," showing some of the main industries in which employment is being provided for the blind. In appealing for the co-operation of employers, the booklet points out that nearly 2,000 blind industrial workers are employed in various industries and it emphasizes the blind workers' qualities of concentration, reliability and productivity.

Czechoslovak Import Duties

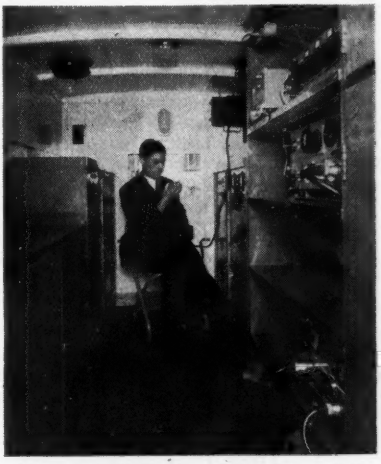
Changes in the Czechoslovak customs tariff in accordance with the Geneva Agreement came into effect on 20th April, subject to a temporary suspension of certain duties. Details published in the *Board of Trade Journal* (24th April) include the following (in crowns per 100 kg):—Receiving apparatus (except for television), amplifiers and electric loudspeakers, all except electronic valves imported separately 9,000 (formerly 12,000); and electric cables and insulated wire, with metal casing, 1,300 (1,600).

Glass Buyers' Guide

A special "Glass Buyers' Guide" has been issued on the occasion of the British Industries Fair by the Glass Manufacturers' Federation, 17, Manchester Street, London, W.1. The booklet contains an excellent review of British glass production by Edward Meigh, vice-president of the Federation, particulars of trade associations and trade papers, a list of Federation members and their products and a good deal of trade information. One section gives a list of members of the Electric Light Fittings Export Group.

Mobile Broadcasting Studio for Brazil

A mobile studio, built into a van, and containing very high frequency-modulated broadcasting equipment has just been shipped from



Marconi mobile broadcasting studio supplied to Brazil

this country by Marconi's Wireless Telegraph Co., Ltd., Chelmsford. It is the last item in a substantial order for broadcasting equipment just completed by Marconi's for the *Jornal do Commercio* of Recife, Brazil. The new equipment will provide a high quality radio link between outside events and the studios in Recife. Similar Marconi frequency-modulated equipment is already installed in the studios to provide a link with the recently-installed 20-kW medium-wave and two 15-kW short-wave Marconi transmitters at the broadcasting station which is in open country near the town of Recife.

Automatic Telephony in an Aircraft Carrier

A G.E.C. automatic telephone exchange which is to be installed in an aircraft carrier will be the first of its kind in one of His Majesty's ships, all previous installations having been of the manual type. The exchange accommodates 500 extensions and will be used for domestic and administrative purposes. Because of the limited size of the hatchways, ten units, each

containing equipment for fifty extensions, will be used, these units being coupled together to give the size of installation required. If desired, the exchange can be extended to accommodate by two further 50-line units.

When coupled to the Post Office telephone system, eight pairs of wires will permit eight conversations and the use of eight teleprinter links. A single position manual board provides inquiry facilities and permits the extension of calls via radio links. The equipment is to be supplied and installed by the telephone works of the General Electric Co., Ltd.

Belfast Engineer's Salary

At a recent special meeting of the Belfast Corporation a resolution passed in January that the salary of the city electrical engineer (Mr. W. J. Girvan) should be based on output was rescinded. The mover of the resolution for rescission said that the Corporation had been under the impression that it was bound by the agreement of the National Joint Committee of Local Authorities and Chief Electrical Engineers. It had since discovered that it was not so bound and the only way to rectify the position was to rescind the resolution. The *Northern Whig* reports that Mr. Girvan is contemplating an appeal to the National Arbitration Tribunal.

B.I.F. Correction

The appliance illustrated in the note on Gillott Electro-Steam Cookers, Ltd , in page 678 of our last issue was the company's double-steam boiler, not the electro-steam cooker as stated.

Trade Publications

Siemens Electric Lamps & Supplies, Ltd., 38 & 39, Upper Thames Street, London, E.C.4.—Catalogue No. 986, dealing with street lighting lanterns.

Hackbridge and Hewittic Electric Co., Ltd., Walton-on-Thames, Surrey.—Technical brochure R200/1 illustrating the application of mercury arc rectifiers to railways.

Metway Electrical Industries, Ltd., King Street, Brighton, 1.—Priced catalogue MYG/1 of elements and spirals for domestic apparatus.

Wembley Electrical Appliances, Ltd., Exhibition Grounds, Wembley Park, Middlesex.—Leaflet and price list of 4-ft 40-W fluorescent lighting units.

Selectra, Ltd., 42, Selcroft Road, Purley, Surrey.—Leaflet illustrating the "Tritherm" warming pad.

Trico-Folberth, Ltd., Great West Road, Middlesex.—Catalogue of motor car accessories.

H. Tinsley & Co., Ltd., Werndee Hall, South Norwood, S.E.25.—Catalogue (111) giving technical information on precision measuring instruments.

Philips Electrical, Ltd., Century House, Shaftesbury Avenue, W.C.2.—Publication A.166 containing illustrated particulars of the company's "Overlamp" dispersive fittings for mercury-vapour and fluorescent lamps, as well as details of these lamps and their equipment.

Cleco Electric Industries, Ltd., Foundry Square, Leicester.—Priced folder illustrating industrial electric trucks.

Morgan Crucible Co., Ltd., Battersea Church Road, London, S.W.11.—Technical brochure on furnaces and folder illustrating a selection of carbon products for all industries.

Brush Coachwork, Ltd., Loughborough.—Catalogue No. 71003 of battery electric vehicles.

Osler & Faraday, Ltd., 89, Newman Street, London, W.1.—Catalogue of non-industrial fluorescent lighting fittings.

Bearing Works Extension

British Timken, Ltd., has received from the Ministry of Supply approval to the extension of its Duston, Northampton, factory, and has also received the necessary building licence.

Trade Announcements

Mr. D. Pardue, director of Frank J. Newman, Ltd., of Cape Town, who will arrive in this country on 5th June, is interested in agencies for various goods including electrical goods. Those wishing to get in touch with him can do so through W. H. Jones & Co. (London), Ltd., "Rasper," Barnet, Herts, or c/o Standard Bank of South Africa, Ltd., 10, Clements Lane, Lombard Street, London, E.C.4.

The telephone number of the West Cumberland Branch of **Downes & Davies, Ltd.,** at Oxford Buildings, Oxford Street, Workington, is Workington 139.

Automatic Coil Winder & Electrical Equipment Co., Ltd.—Catalogue of coil winding machines and accessories.

Metal Components, Ltd., have moved their factory and offices to newly-erected premises in Dolphin Road, Shoreham-by-Sea, Sussex (telephone: Shoreham 2224-5).

Export Inquiries

WE have received the undermentioned inquiries from firms and individuals overseas who wish to secure agencies for British electrical equipment and appliances or to import them into their territories. We shall be glad to pass on to them replies received from readers, which should be addressed to the Editors, quoting the number given in parentheses. We cannot vouch for the standing of inquirers and manufacturers replying to them will no doubt require the usual references:—

Egypt.—A Cairo agent wants to get into touch with British manufacturers of cables and wiring accessories, fluorescent lamps and domestic-size refrigerators. (X.199.)

Industry and the House

Inventions and Monopolies

THE Development of Inventions Bill, given its second reading in the House of Lords on Thursday last week, was a fitting continuation of the theme contained in the Monopoly Bill debated in the House of Commons during the previous week. The suppression of inventions, the exploitation of the inventor, and the existence of price rings and monopolies have always been favourite themes for Socialist speeches which seek to denounce the industry and enterprise of this country. Much of the venom has disappeared and the two Bills, by the opportunities which they provide, will do much to remove the suspicion of the past which was always much greater than was justified.

The Bill was introduced by Viscount Hall, First Lord of the Admiralty, who quoted several examples of inventions which had not been taken up in this country. There was the differential calculus machine invented by Charles Babbage which, through lack of interest in this country, had been taken up in the United States of America, which country retained its lead in this field up to the present time. Viscount Hall did not however indicate whether these machines had proved a commercial proposition. The Bill was based on the Swan Committee's recommendations on patent law and recommendations of the Scientific Advisory Council. In winding up the debate, Lord Chorley said that the real problem arose over the man who had a brilliant idea but who was unable to get financial backing to exploit it. The Development Corporation would be in close touch with industry to see if such inventions could be properly exploited.

By F. J. Erroll,
M.A., A.M.I.E.E., M.P.

Few references were however made to industry's constant search for new and profitable ideas. So often, as was mentioned in the Swan Committee's Report, inventors have exaggerated ideas of the value of their own inventions. Disappointed at their lack of success, they assume that everyone is against them. It was an agreeable feature of this debate that stories of this sort were almost completely absent. When the Bill comes to the Commons it may be otherwise.

Although the Opposition did not divide against the Second Reading of the Monopoly Bill they consider that it raises issues of fundamental importance, and may well do as much to alter the pattern of industry in the future as the nationalization programme of the present Government. The proposed Commission will necessarily be able to investigate only a very small part of Britain's industrial activity, but manufacturers contemplating price-fixing and other agreements will listen to what the Commission says in order to avoid becoming the object of an inquiry. It will be all to the good if the restrictive tendencies of the inter-war years can be swept away, although the Opposition is disappointed that the restrictive practices of the trades unions are excluded from the Bill. There is some humour in a situation where a Government, having set up the great national monopolies of coal, electricity and transport now poses as the champion of free competitive enterprise. Many of the price maintenance agreements were designed before the war to maintain wage standards for the employees. Free competition cannot fail to have its effect upon wages when normal conditions return.

The main details of the debate were reported in last week's *Electrical Review*, especially as far as the activities of E.L.M.A. were concerned. The House expected the lamp ring to come in for some criticism, but even Socialist M.P.'s were impressed with the defence put forward by Mr. Oliver Lyttelton.

Editorial comment in the *Electrical Review* of 23rd April concerning the salary of Mr. Sylvester, the new chairman of the Gas Council found an echo in the House of Commons. It appears that in addition to his salary of £6,000 a year, Mr. Sylvester receives a pension of £3,500 a year from his former employers, the Gas Light & Coke Co. The chairman of the Gas Council is thus drawing £9,500 a year from the industry, although as Mr. Gaitskell, the Minister of Fuel and Power, pointed out, the pension is a private arrangement and not the Minister's concern. "I am simply concerned with paying the rate for the job," he added. Allowances payable under 5 (6) of the Bill have still to be determined.

The terms of compensation for redundant electricity officers is being carefully watched by Mr. Gammans, the Member for Hornsey.

Mr. Robens admitted that officers may have been stood off without compensation for the simple reason that the terms have not yet been made known, but he is prepared to look into any individual case. As constituents write in, M.P.'s of all parties are beginning to learn the practice of the National Coal Board in regard to their redundant officers An officer on being informed that he is redundant is given a certain period of notice on full pay and invited to submit a claim for compensation. If the matter cannot be settled to the satisfaction of both parties immediately, the Coal Board is prepared to allow interim payments to the individual without prejudice to the final settlement. Redundant officers, many of whom are in their late fifties or early sixties, are being asked to give details of such efforts as they may have made to obtain alternative employment. It looks as though the amount of their compensation may well depend on whether they have taken all reasonable steps to try to obtain some other job, even at a much lower salary, the difference in salaries presumably being wholly or partly made up by the amount of compensation. Each Board has a fairly wide latitude in this as in other matters, but Ministerial control being what it is, some uniformity of treatment is to be expected.

Parliamentary News

By Our Special Reporter

THE House of Lords gave an unopposed second reading last week to the Radio-active Substances Bill. Lord Henderson explained that its primary purpose was to protect the health of the workpeople and the general public against the harmful effects of undue exposure to radiation from natural radio-active and artificially produced substances and certain types of apparatus. Recent developments in nuclear physics and electrical engineering had created a new situation. Artificially radio-active substances would soon be available in considerable quantities. The development of X-ray apparatus of much greater power, of the cyclotron betatron and synchrotron all added greatly to the need for protection.

Pollution from Power Station

In the House of Commons last week Mr. H. Morrison informed Mr. Hugh Fraser that measurements of sulphur pollution in the air were being made by the Department of Scientific and Industrial Research in many parts of the country, including areas near power stations and some information was already available on the effect of sulphur on buildings and vegetation. The Department was already trying to find methods of removal of sulphur from the flue gases of power stations which would be less costly and troublesome than those at present in use. The problem was not an easy one and a quick remedy could not be expected.

Tax on Water Heaters

Commander Nobel asked the Chancellor of the Exchequer whether he was satisfied that the increase to 100 per cent in the purchase tax on gas water heaters would not result in a greater proportionate consumption of solid fuel.

Mr. Glenvil Hall said it was hoped that the tax would deter the installation of appliances which made fresh demands on the limited gas supplies. There would be the opportunity for any statement that the House might require when the proposals in the Finance Bill were under discussion.

[NOTE: The 100 per cent tax applies also to electric water heaters.—*Editors, Electrical Review*].

Australian Notes

From Our Australian Correspondent

THE State Electricity Commission of Victoria reports that electricity production and sales were greater during the financial year ended 30th June, 1947, than during any previous year and the total of new consumers added was the highest yet recorded. Rural electrification broke all previous records, and industrial power consumption exceeded the peak wartime total. The Commission now operates a network of 11,458 miles of transmission and distribution lines, serving 660 centres throughout a large area of Victoria as well as five New South Wales municipalities.

Sydney Deficit.—The Sydney County Council, which last August raised its charges for electricity, states that another increase may be necessary soon. A deficit of £227,338 has been shown on trading operations in 1947, fuel costing £241,000 more than the previous year, and wages £449,000 more.

Domestic Appliance Sales.—Although sales of domestic electrical apparatus have dropped slightly in New South Wales, sales in other States have been excellent. The Commonwealth Bank reports that sales of lighting equipment in both New South Wales and Victoria showed an increase in December last, over those for December, 1946. Supplies of domestic refrigerators are increasing, but the demand is still well above current supplies, and some dealers are still taking orders for delivery " in eighteen months or more."

N.S.W. Transport Loss.—In spite of a recent increase in fares the New South Wales Government tram and bus services are likely to show a loss of about £500,000 in the year 1947-48. (The loss in 1946-47 was £610,813.) The main cause, it is stated, is the introduction of the 40-hour week.

Sales Management

E.D.A. Conference in London

TO-DAY sees the conclusion of a very successful sales management conference organized by the British Electrical Association at the Connaught Rooms, London. Over 350 persons attended. Lord Citrine, chairman of the British Electricity Authority, gave an address at the official opening of the conference on Tuesday, Mr. V. W. Dale, general manager and secretary, E.D.A., taking the chair.

"Service to Consumers" was the subject of the first paper to be read. In it Mr. E. Bates (Luton) dealt with the facilities offered to consumers—hire-purchase, etc.; general and specialist representatives; electricity service centres; the use of travelling demonstration vans; service by correspondence; the size of a service area; staff organization, etc. Speaking on "Electricity in Education," Mr. J. P. Stephenson (City of London School) outlined the present educational system and electricity's share in the school curricula and indicated how the electrical industry could help. In the evening E.D.A. films, including "Farming with Electricity" and "Prelude to Prosperity," were shown, accompanied by a number of school films dealing with cookers, vacuum cleaners, refrigerators and house installations.

On Wednesday Mr. G. T. Allcock and Mr. W. B. Steele (Gt. Yarmouth) dealt with large-scale cooking, referring to methods of consumer approach, sale versus hire of equipment, load characteristics, service and maintenance, kitchen planning and the use of models. A paper by Mr. A. M. Grey (Abingdon) on "The Supply Aspect of Electrical Glasshouse Heating and Soil Warming" covered load characteristics and possible developments, "valley" filling and peak restricting, the approach to the consumer, "selling temperature and not electricity," and removing popular fallacies.

Thursday's topics for discussion were display and industrial design. On the former subject Mr. N. F. Phillips (exhibition organizer, E.D.A.) defined the purposes of display and indicated practical methods of applying basic principles to advantage.

Mr. H. J. Foxlee (member of the Society of Industrial Artists) made special reference to the scope for better industrial design in the electrical industry and the significance of training the industrial designer of the future. This morning's paper by Mr. F. H. Smethurst (Islington) on "The Ciné Film in Relation to Industry" will be followed by the conference luncheon.

Next Week's Events

Monday, 10th May

GREAT YARMOUTH.—Electrical Trades Union. Annual conference (10th-14th May).

Tuesday, 11th May

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Radio Section. "Carrier Frequency Shift Telegraphy," by R. Ruddlesden, E. Forster and Z. Jelonek, and "Some Developments in Communication Point-to-Point Radiotelegraphy," by J. A. Smale.

WIMBLEDON.—Compton Hall, 8.15 p.m. A.S.E.E. South-West London Branch. "Installation and Testing," by J. P. Mulville.

Wednesday, 12th May

BIRMINGHAM.—James Watt Memorial Institute, Gt. Charles Street, 6.30 p.m. I.E.E. South Midland Students' Section. Annual general meeting.

BRADFORD.—Midland Hotel, 7.30 p.m. A.S.E.E. Bradford District Branch. "Practical Application of X-rays from a Diagnostic Point of View," by E. Hudson.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Transmission Section. "Transformer Economic Efficiency," by B. Calvert.

I.E.E. London Students' Section. Visit to Ealing Film Studios.

MANCHESTER.—I.E.E. North-Western Students' Section, 3 p.m. Visit to W. T. Glover & Co., Ltd., Trafford Park.

NEWCASTLE-ON-TYNE.—Neville Hall, Westgate Road, 6 p.m. British Institution of Radio Engineers (North-Eastern Section). Annual meeting. "Supervisory Control," by L. G. Brough.

NORTHAMPTON.—College of Technology, St. George's Avenue, 7.15 p.m. Northampton and District Electrical Association. "The Protection of A.C. Plant and Equipment," by H. M. Marklew.

Thursday, 13th May

LONDON.—Savoy Place, W.C.2, 5.30 p.m. Institution of Electrical Engineers. Annual general meeting, followed by film on "Atomic Physics."

London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1, 6 p.m. British Institution of Radio Engineers (London Section). "The Calculation of Electrode Temperatures in the Radio Valve," by L. A. Harris.

MANCHESTER.—College of Technology, 6.45 p.m. British Institution of Radio Engineers (North-Western Section). "The Wave Analysis of the Low Frequency Potentials of the Human Body," by W. E. Boyd.

ELECTRICITY SUPPLY

Manx Hydro-electric Scheme. Berlin Power Station Reconstruction.

Bradford. — HOUSE RE-WIRING SCHEME.— Approval has been given by the Corporation Estimates Sub-Committee to an estimate of £5,766 for the re-wiring of 250 houses on the Bierley estate in Bradford.

Colchester.—ELECTRIC PUMPING PLANT. — The Corporation is submitting to the Eastern Electricity Board a scheme for the electrification of the pumping station at Balkerne Hill and the sinking of a further borehole near Sheepen to be operated by electricity. The engineers estimate the cost of extending the e.h.v. main, providing switchgear and transformer, and transferring existing substation equipment at £5,722.

Isle of Man.—HYDRO-ELECTRIC PROPOSAL.— It is reported that the Tynwald Court is to consider plans for a hydro-electric scheme estimated to cost about £1,000,000. The scheme involves the construction of a dam in the hills near Kirk Michael.

Jarrow.—ESTATE LIGHTING.—A licence has been issued to North-Eastern Trading Estates, Ltd., for the installation of electric street lighting on the Bede trading estate at a cost of £4,500.

Lanarkshire. — MAIN-ROAD LIGHTING. — The County Council has approved a scheme for lighting the main Glasgow-Carlisle Road between Mount Vernon and Uddingston, at a cost of £4,400.

Merseyside and North Wales.—SUPPLY TO LLANDYRNOG.—A representative of the Merseyside and North Wales Electricity Board gave details of the proposals for extending the supply to the Llandyrnog district at the annual parish meeting. He gave an assurance that construction would commence immediately the materials had been received.

Wirral.—PROPOSED TRANSMISSION LINE. — Objections to the British Electricity Authority's proposal to erect towers in the North Wirral were heard at a Ministry of Fuel and Power inquiry held at Birkenhead on 28th April. The objectors were Wallasey and Birkenhead Corporations, Cheshire County Council, and Hoylake U.D.C. For the B.E.A. it was stated that all the plant at Wallasey generating station was more than twenty years old. Before the war, the station would have been shut down as having finished its useful life. To take the mains underground from Prenton would cost a total of £648,000, including £413,000 to separate the supply to Wallasey, which would be necessary if the lines went underground. The alternative scheme—carrying 132-kV lines on steel towers —would cost only £353,000 and would have the additional advantage of enabling further reinforcement to be made more easily. The total length of the overhead line from Prenton to Hoylake and Wallasey would be 8·3 miles, to be carried on forty-seven towers. The main objections were that the towers would spoil the amenities of an area scheduled for extensive residential development. The decision of the Minister will be made known in due course.

Overseas

Egypt.—SWEDISH PLANT FOR ASWAN DAM.— Two Swedish firms will take part in the construction of the Aswan Dam power station in Upper Egypt. The Asea Co., of Västorås, will provide two 49,500-kVA generators. These will have a stator diameter of nearly 32 ft (9·7 metres), and each complete generator will weigh about 650 tons.

As the primary function of the Aswan Dam is to provide for irrigation and flood control, the water turbines must be designed to operate at a head of water varying between 26 and 105 ft (8 and 32 metres). The turbines will be of the Kaplan type, and five of the total number of seven turbines will be supplied by the Swedish company Karlstads Mekaniska. Verkstad.

Germany.—WEST BERLIN STATION RECONSTRUCTION.—Work has started on the reconstruction of the Berlin West power plant, the largest of its kind in Germany. Rebuilding of the plant was decreed recently by British and American authorities. New transformers, turbines, switchgear and instruments are being built by the Siemens Schuckert works in Berlin, Nuremberg and Mulheim, and the Siemens & Halske works in Berlin. The rebuilt station will have a capacity of 110 MW, one-third of all the power now used in Berlin, which is at present primarily dependent on the Soviet sector for its power supply.

TRANSPORT

Australia.—BRISBANE SUBURBAN RAILWAY ELECTRIFICATION.—Eight reasons are given in support of a recommendation that the Brisbane suburban railways should be converted to electric traction in a report submitted by a special committee set up by the Queensland Government. These include improved and quicker services and the absence of smoke and grit. The scheme, it is stated, would be economically sound from the outset, and the railways would be able to play their full part in suburban passenger transport which they could never do under steam conditions. That they must be capable of doing this will become imperative as the city expands. The system proposed is 1,500-V d.c. overhead wires with all-steel multiple-unit cars. The estimated cost of £2,504,600 would provide for a 50 per cent increase in the number of passengers carried and a 30 per cent increase in schedule speeds.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

W. T. Henley's Telegraph Works Co., Ltd.—Net profits for 1947, at £716,342, show an increase of £384,789 compared with the previous year. To this is added £50,150 (nil) profit on realization of subsidiary company, making £766,492. In the preliminary statement giving these figures, subject to audit, it is pointed out that on last year's basis the 1947 net profits would have been £649,342 compared with £252,553 for 1946, the alteration being due to the different method of dealing with the provision for fluctuation in the prices of materials.

A sum of £175,000 (£75,000) is transferred to post-war contingencies reserve and £60,000 (nil) is provided for special depreciation and obsolescence of buildings, plant and machinery. Other allocations are £67,000 (£78,000) for fluctuation in prices of materials; £100,000 (£10,000) for staff pensions; and £20,000 (nil) for educational purposes. Early last month the directors agreed to limit distributions and the final ordinary dividend of 10 per cent and bonus of 5 per cent maintains the total for the year at 20 per cent. The additional 1,300,000 5s. shares offered to stockholders last month do not rank for the final dividend and bonus. The carry-forward is £610,364 against £413,822 brought in.

The Chloride Electrical Storage Co., Ltd., reports profits for the nine months ended 31st December last, including twelve months for subsidiaries, of £1,108,821, before taxation. For the year ended 31st March, 1947, the profits were £761,430, after providing for E.P.T. The directors have decided to pay, in addition to the 5 per cent paid on 31st December, a further dividend of 5 per cent, and a bonus of 10 per cent, making 20 per cent, less tax on the "A" and "B" ordinary stock for the nine months. These payments are the same as for the year ended 31st March, 1947.

Telegraph Construction & Maintenance Co., Ltd.—At the company's annual meeting Lord Colgrain (chairman) said that the balance of the trading account, £159,912, was practically identical with last year's, in spite of the fact that owing to the fuel crisis the works were completely closed for three weeks and lost practically two months' output owing to the interruption in the flow of raw materials. Throughout the year the general shortage of raw materials had been a severe handicap to production. They hoped that conditions would gradually ease and enable them to proceed more expeditiously with the orders they had on hand, which were largely in excess of those at the end of the previous year.

Certain new lines had been added to their production and more were in the laboratory stage and would be offered to customers when the production position was more clearly defined. An extension of the incentive bonus for the workpeople had resulted in increased output. They had also set up production committees, and under their educational scheme for members of the staff and apprentices examinations were held. The work in their research departments included considerable advances in the manufacture of land communication cables for high frequency transmission, submersible repeaters for submarine telegraph and telephone cables, and work in the field of plastics in relation to power transmission cables. The metallurgical research programme was equally well forward.

The Ever Ready Co. (Gt. Britain), Ltd., reports net earnings for the eleven months to the end of February last of £531,370, as compared with £381,968 for the year ended 31st March, 1947. The final ordinary dividend is 25 per cent, again making 40 per cent for the year. In March last the directors decided not to recommend any increases in dividends during 1948. Reserves and carry-forward are £1,668,656 (against £1,525,967).

The Ever Ready Trust Co., Ltd., reports net revenue for the year ended 31st March of £34,038 (against £34,575). The dividend for the year is maintained at 11 per cent and £14,083 (£13,045) is carried forward. A profit of £35,000 on exchange of investments is carried to capital reserves.

Sangamo Weston, Ltd., report trading profits for 1947 of £197,179 (against £105,444 for 1946), with other income of £1,815 (£2,080). Tax absorbs £99,665 (£36,948) and after providing for depreciation, fees, etc., there is a net profit of £76,255 (£47,001). The dividend is unchanged at 17½ per cent and £235,840 (£174,744) is carried forward.

The Cawnpore Electric Supply Co., Ltd., is paying a final ordinary dividend of 6 per cent, making 10 per cent for the 8½ months to 15th September, 1947, when the Government of the United Provinces took over the undertaking. The profit for the period was £61,276. For the year ended 31st December, 1946, there was a net profit of £54,092 and the distribution for the year was 13 per cent.

The West London & Provincial Electric & General Trust, Ltd., reports a net profit for the year ended 31st March last of £16,522, as compared with £15,921 for the preceding year. The final dividend is 4 per cent, plus a bonus of 1 per cent, again making 7 per cent for the year. General reserve receives £3,000, and £5,778 is carried forward.

Heatrae, Ltd., has recommended an unchanged dividend of 12½ per cent for the year.

Babcock & Wilcox, Ltd., propose to pay a final dividend of 7 per cent and a cash bonus of 3 per cent, again making 12 per cent for the year. The profit for 1947, before tax, amounted to £825,755, less transfer to general reserve of £100,000. This compares with a profit in 1946 of £766,109, plus £13,380 provision for civil defence not required and less £100,000 for obsolescence.

The Rawlplug Co., Ltd., reports a net profit for 1947, after profits tax but before income tax, of £151,615, against £113,249 for 1946 (after E.P.T. but before income tax). The directors have decided, in compliance with the Chancellor's request, not to increase the ordinary distribution. It is proposed to consolidate the final dividend and bonus in a payment of 35 per cent, making 45 per cent for the year.

The National Electric Construction Co., Ltd., proposes to pay a first and final dividend of 10 per cent, the same as last year.

New Companies

Glass Bulbs, Ltd.—Registered 28th April. Capital, £999,999, in £1 shares (333,333 "A," 333,333 "B" and 333,333 "C"). Manufacturers and sellers of, agents for, and dealers in, glass bulbs, whether for electrical or other apparatus and equipment, articles made of glass or similar material, etc. Holders of the "A," "B" and "C" groups of shares may each appoint three directors. A quorum is to consist of three of whom one must be an "A" and one a "B" director. So long as the General Electric Co., Ltd., holds one-third of the issued capital, it shall appoint one of the "B" directors to be chairman, and so long as the British Thomson-Houston Co., Ltd., holds one-third of the issued capital, that company shall appoint one of the "A" directors to be vice-chairman. Pending formal appointment of the "A" and "B" directors, H. A. Lingard, V. C. H. Creer and G. Hamilton are to act as "A" directors and G. Chelioti, W. H. Williams and M. Ryle as "B" directors. Regd. office: Crown House, Aldwych, W.C.2.

T. E. Margetson, Ltd.—Registered 7th April. Capital, £1,000. To acquire the business of an electrical engineer and contractor carried on by T. E. Margetson at 5, Morven Grove, Southport, as T. E. Margetson & Co. Permanent directors: T. E. Margetson and Mrs. Julia M. Margetson. Regd. office: 18a, Linaker Street, Southport.

Watts, Faulkner & Co., Ltd.—Registered 12th April. Capital, £1,000. To acquire the business of electrical contractors carried on by D. L. Watts and L. W. Faulkner at 14, High Street, Ringwood, Hants. Directors: D. L. Watts and L. W. Faulkner. Regd. office: 14, High Street, Ringwood, Hants.

Meadow Electricals, Ltd.—Registered 15th April. Capital, £1,000. Manufacturers, repairers and dealers in dynamos, motors, armatures, magnetos, electrical and other washing machines, ice-cream making machinery, etc. Directors: W. H. Ayres (permanent governing director) (director of Refrigeration Service, Ltd.), and J. Nuttall, 10, Hillcrest Drive, Levenshulme, Manchester. Regd. office: 257, Stockport Road, Ashton-under-Lyne.

Companies to be Struck Off Register

The names of the following companies will be struck off the Register at the expiration of three months from 23rd April, 1948, unless cause is shown to the contrary: Baines' Dielectrics, Ltd.; Midland Wholesale Radio Co., Ltd.

Increases of Capital

British Electrical Repairs, Ltd.—Capital increased by £100,000, in £10 shares, beyond the registered capital of £50,000.

RAP Distribution, Ltd.—Capital increased by £50,000, in £1 shares, beyond the registered capital of £75,000.

Liquidations

Green Electrical Industries, Ltd.—First and final dividend of 1s. 9d. in the £, payable 6th May at the office of A. E. Attwood & Co., Queen Street Chambers, 90, Queen Street, Cheapside, London, E.C.4.

International Hydro-Electric Development Syndicate, Ltd.—Winding up. Liquidator, Mr. S. Howell, 23, Plympton Road, London, N.W.6.

Parfax Electric Co., Ltd.—Meeting of members on 31st May, at 42, St. George's Place, Canterbury, to receive an account of the winding-up by the liquidator, Mr. L. Whitaker.

C. Price & Co. (Electricians), Ltd.—Last day for receiving proofs for dividend 14th May. Liquidator, Mr. R. A. Haigh, Court Chambers, Friar Lane, Leicester.

Bankruptcies

R. H. Tuck, 7, Grand Parade, Upper Richmond Road, S.W.14, electrical engineer, and lately carrying on business with another as London Electrical Contractors, at 109, Great Russell Street, W.C.1, and at 9, Newman Street, W.1, and also carrying on business with another as Brotherton & Tuck, at 9, Newman Street, London, W.1.—Receiving order made 12th April, 1948, on debtor's own petition. First meeting 7th May and public examination 15th June, both at Bankruptcy Buildings, Carey Street, London, W.C.2.

A. H. Smith, sales manager, formerly company director, and lately carrying on business at 62-64, Lower Sloane Street, London, S.W.1, electrical engineer.—Trustee, Mr. T. J. M. Macleod, 4, Bucklersbury, London, E.C.4, appointed 16th April, 1948.

A. A. Lumelino, lately trading as Star Electrical Service, of and lately carrying on business at Cranley Mews, South Kensington, S.W.5, electrical contractor.—Trustee, Mr. C. L. Walker, 23a, St. James's Street, London, S.W.1, appointed 16th April, 1948.

STOCKS AND SHARES

THE firmness of Stock Exchange markets as a whole may be said to provide something of a feature. It takes a good many people by surprise, in view of the handicaps imposed by limitation of dividends and profits; by politics, at home and abroad; and by the generally unsettled conditions throughout the greater part of the world. Transport and Electricity Stocks hold their ground and the money which has been flowing into them will probably be supplemented by the capital realized through the paying-off this week of Argentine Railway debenture stocks.

Henley's Profits

On the whole, the season of annual reports, now in full swing, is producing a consistently good crop of profits, although the dividend limitation principle stands between shareholders and the tangible benefits. The preliminary profits statement of W. T. Henley's Telegraph Works Co. provides one of the high lights, showing the remarkable increase of £385,000 in net profits, to a total of £716,000. Calculated on last year's basis, the expansion looks even more impressive. The price of the £1 shares has strengthened to 24s., at which the yield on the dividend, repeated at 20 per cent, is £4 3s. 4d. per cent. The new shares, issued to shareholders last month at 21s., stand at 3s. premium. They will be available free of transfer stamp until the last call of 11s. per share is paid on the 28th of this month, but they are not entitled to the final dividend just declared.

Electric Batteries

Ever Ready's announcement of greatly increased profits during the eleven months ended last February has drawn attention to the relatively high yield on the company's 5s. ordinary shares. These have hardened to 37s., including the final dividend of 25 per cent, but still show a return of £5 8s. 1d. per cent on the total distribution of 40 per cent. The 7 per cent preference participate, as usual, to the extent of a further 3 per cent. At 50s. they pay 4 per cent on the money. A return of £4 1s. 4d. per cent is available from Chloride Electrical Storage "A" and "B" £1 ordinary, quoted at 98s. 9d. The distribution of 20 per cent, including 10 per cent bonus, is again on conservative lines.

Telegraph Condenser

Typical of the sort of equity referred to above are the 10s. shares of the Telegraph Condenser Co., whose dividend and preliminary profits statement made a good impression last week. Trading profits were virtually doubled during 1947, with the result that the net cost of maintaining the year's distribution at 15 per cent is covered well over four times by available earnings, despite an increase of £67,000 in income-tax liability. From the surplus, another £20,000 is being added to general reserve, bringing the total to £95,000, and £25,000 is allotted to the supplementrary pensions fund. Capital consists of £150,000 ordinary and £130,000 6 per cent preference stock. The latter can be redeemed at 22s. any time after next year. The 10s. ordinary shares are quoted at 37s. 6d. x.d. to yield exactly 4 per cent.

New Preference Shares

Dorman & Smith Holdings 6 per cent preference shares are now quoted in Manchester at about 1s. above the recent "placing" price of 22s. 6d. The yield works out at £5 2s. 3d. per cent. Lists opened last Tuesday week for subscription to the issue of Thomas Bolton & Sons 4½ per cent £1 second preference shares at par. Particulars of the issue showed that profits in 1946-7 were about three times the dividend requirements of this and the senior 5 per cent preference issue, and are estimated to have increased during the year ended in March. British Insulated Callender's control the company. An unusual feature of the shares is that they are definitely redeemable, at 21s., in 1978, or at any time after 1963 on three months' notice.

Changes on the Month

Changes marked in our price lists this month show that, despite reactions, industrials are mostly higher now than they were before the Budget. Among the leaders in the electrical equipment market, G.E.C. have recovered 3s. 6d. during the month, to 88s. 6d. Interest has been aroused by the company's new electric lamp bulb enterprise to be developed jointly with the B.T.H. Co. Telegraph Constructions at 49s. 3d. reflect the good annual accounts, and Johnson & Phillips at 73s. 9d. have added 6s. That amount has been gained also by Revo at 60s. and Arons at 56s. 3d. Lancashire Dynamos at 5½ are as much as 10s. to the good, and Ward & Goldstone are up 7s. 6d., to 60s. Useful improvements are shown in Ericssons, Automatic Telephones, Siemens, H.T.A., Enfields, Reyrolle, and a string of others. Walsall Conduits at 60s. have put on 6s. 3d. Tube Investments are similarly higher at 6½.

Aberdare Cables

According to market reports, the public will be given an early opportunity to take an interest in Aberdare Cables, the Glamorganshire manufacturers under Sir George Usher's chairmanship. A figure of £3 for the £1 ordinary shares is mentioned as a possible basis for the introduction of a limited number of shares. Sir George is managing director of International Combustion, which holds interests in the cable company. He is also chairman of Aberdare Cables of South Africa, which acts as selling agent for the British company and is expected shortly to be in production on its own account at the new Port Elizabeth factories. This company's 5s. shares are quoted at 18s. A maiden dividend of 2½ per cent was declared in January.

ELECTRICAL INVESTMENTS

Past Month's Price Changes

Company	Dividend Previous	Dividend Last	Middle Price 3 May 1948	Month's Rise or Fall	Yield p.c.
Overseas Electricity Companies					£ s. d.
Atlas Elec. ..	Nil	Nil	15/6	+1/-	—
Calcutta Elec. ..	6†	6†	46/6	+6/6	2 11 6
Cawnpore Elec...	13	13	57/6	+2/6	4 10 3
EastAfricanPower	7	7	43/6	+2/-	3 4 3
Jerusalem Elec...	5	6	20/3	..	5 18 5
Madras Elec. ..	8	5	40/6	+1/-	2 9 6
Nigerian Elec. ..	12½	10	35/-	..	5 14 3
PalestineElec."A"	6†	7†	30/-	+½	4 13 4
Perak Hydro-elec.	6	7	15/6	..	—
Tokyo Elec. 6% .	—	—	51½	−1	—
VictoriaFallsPower	19	19½	7½	+⅜	2 12 0
WhitehallInv.Pref.	—	6	25/6	..	4 14 1
Equipment and Manufacturing					
Aron Elec. Ord...	10	15	56/3	+6/3	5 6 9
Assoc. Brit. Eng.	12	12	37/6	—	6 8 4
Assoc.Elec.Ord...	15	15	73/9	−⅛	4 1 7
AutomaticTel.&El.	12½	12½	63/9	+⅛	3 18 7
Babcock & Wilcox	12½	15	71/6	+2/9	4 3 10
Baldwin,H.J.(2/-)	10	20	9/6	−6d.	4 4 2
British Aluminium	10	10	50/-	+1/-	4 0 0
B.I. Callender's..	—	6¾	33/9	−9d.	4 0 0
British Rola (2/-)	15	10	2/9	−6d.	7 5 6
BritishThermostat (5/-)	23½	23½	23/9	..	4 18 9
BritishVac.Cleaner (5/-)	20	20	16/-	+2/3	6 5 0
Brush Ord.(5/-)..	4	—	7/6	+1/-	—
Burco (5/-) ..	20	35	26/3	+6d.	6 13 4
ChlorideEl.Storage	20	20	98/9	+⅛	4 1 0
Cole, E. K. (5/-)..	20	22½	16/6	−1/6	6 16 5
Cossor, A. C. (5/-)	12½†	25	10/6	−5/-	—
Crabtree (10/-) ..	17½	17½	41/9	+3/3	4 4 2
CromptonParkinson Ord. (5/-) ..	22½	22½	27/-	+6d.	4 3 4
De La Rue (5/-)	45	50	43/9	+⅛	5 14 2
Decca (1/-) ..	112½	112½	25/-	−6/3	4 10 0
E.M.I. (10/-) ..	8	6	17/9	+3d.	3 7 7
Elec. Construction	12½	12½	52/6	+5/-	4 15 3
Enfield Cable Ord.	7½	7½	36/3	+3/-	4 2 9
English Electric .	10	10	48/9	..	4 2 0
Ericsson Tel. (5/-)	20†	20†	47/-	+2/6	2 2 7
Ever Ready (5/-)	40	40	37/-	+2/6	5 8 1
Falk Stadelmann	10	15	46/3	+⅛	6 9 4
Ferranti Pref. ..	7	7	35/-	−1/-	4 0 0
G.E.C. Ord. ..	17½	17½	88/6	+3/6	3 19 2
GeneralCables(5/-)	25	50	42/6	..	5 18 0
Greenwood&Batley	15	15	50/-	..	6 0 0
H.T.A. (10/-) ..	10	10	18/-	+1/6	5 11 0
Heatrae (2/-) ..	12½	12½	4/-	−1/-	6 5 0
Henley's (5/-) ..	20	20	24/-	+1/-	4 3 4
Hopkinsons ..	20	22½	100/-	+5/-	4 10 0
Intl. Combustion (5/-)	37½	37½	45/-	−⅛	4 3 4
Johnson & Phillips	15	15	73/9	+6/3	4 1 7
LancashireDynamo	22½	22½	5½	+10/-	4 1 9

Company	Dividend Previous	Dividend Last	Middle Price 3 May 1948	Month's Rise or Fall	Yield p.c.
Equipment and Manufacturing *(Continued)*					£ s. d.
Laurence,Scott(5/-)	12½	12½	11/6	+1/-	5 8 8
London Elec.Wire	7½	10	45/-	+2/6	4 9 0
Mather & Platt ..	11	11	53/9	+2/6	4 2 2
Metal Industries(B)	9	10	45/9	+9d.	4 7 4
Mid. Elec. Mfg. ..	35	35	8½	+½	4 5 0
Murex	20	20	90/-	+⅜	4 9 0
Newman Ind.(2/-)	22½	22½	7/3	+9d.	6 4 4
Plessey (5/-) ..	30	20	15/-	−⅜	6 13 4
Parsons C. A. ..	—	12½	63/9	+½	3 18 7
Pye Deferred (5/-)	25	25	21/3	+⅛	5 17 8
Radio & Tel. (2/-)	40	—	6/6	..	—
Revo (10/-) ..	20	27½	60/-	+⅜	4 11 8
Reyrolle ..	12½	12½	65/9	+4/6	3 16 4
Scophony (5/-) ..	—	—	2/6	−1/-	—
Siemens Ord. ..	7½	7½	35/-	+2/3	4 5 9
Strand Elec. (5/-)	12½	17½	10/6	..	8 6 8
Switchgear&Cowans (5/-) ..	10	20	20/-	+1/6	5 0 0
T.C.C. (10/-) ..	15	15	37/6	+½	4 0 0
T.C. & M. ..	10	10	49/3	+2/3	4 1 4
Telephone Mfg.(5/-)	9	9	10/3	+1/-	4 9 0
Thorn Elec. (5/-)	20	25	21/3	..	5 18 0
Tube Investments	22½	25	6½	+⅜	3 17 0
Vactric (5/-) ..	Nil	Nil	9/6	−6d.	—
Veritys (5/-) ..	7½	2½	5/-	..	2 10 0
WalsallConduits(4/-)	55	70	60/-	+⅜	4 13 4
Ward & Goldstone (5/-)	35	50	60/-	+½	4 3 4
Watford (2/-) ..	15	15	6/6	+6d.	4 12 4
WestinghouseBrake	14	14	67/6	+⅜	4 3 4
West, Allen (5/-)	10	10	11/-	+1/-	4 11 0
Transport and Communications					
Anglo-Am. Tel.: Pref.	6	6*	117½	+7½	5 2 2
Def.	1½	1½*	20½	+3	7 6 4
Anglo-Portuguese	8	8	32/-	+2/-	5 0 0
Brit.Elec.Traction: Def. Ord. ..	45	50	1805	+30	2 15 6
Calcutta Trams..	7½	Nil	37/6	+5/-	—
Cape Elec. Trams	5	6	32/9	..	3 13 2
Cable & Wireless: 5½ Pref. ..	5½	5½	125½	+3	4 7 8
Ord.	4	4	205	+26	1 19 0
CanadianMarconi$1	Nil	4 cts.	10/-	+6d.	—
Globe Tel. & Tel.Ord.	8½†	5†	45/-	+2/6	2 4 6
GreatNorthernTel. (£10)	18	15	24½	−1	6 2 6
Inter. Tel. & Tel.	Nil	Nil	20	..	—
Marconi-Marine..	7½	7½	34/6	+3/-	4 7 4
Oriental Tel. Ord.	4	10	47/3	−2/-	4 4 9
Telephone Props.	6	6	18/6	..	6 9 9
Tele. Rentals(5/-)	10	10	11/3	+1/-	4 9 0
T. Tilling ..	10	10	97/6	..	2 1 0

* Dividend postponed.
† Dividends are paid free of Income Tax.

RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

Towel Rails

ELECTRICALLY heated towel rails utilizing an oil sealed circulating system are manufactured by HURSEAL, LTD., 229-231, Regent Street, W.1. Two sizes are available, viz., 36 in. (91·4 cm) high by 30 in. (76·2 cm) wide with a loading of 125 W and 36 in. high by 36 in. wide rated at 135 W.

Food Emulsifier

A food chopper and mixer suitable for commercial and domestic use is a new product of the CRITTALL KITCHEN EQUIPMENT CO., LTD., 156, Great Portland Street, London, W.1. The "Turmix" has a mixing capacity of 1·76 pints (1 litre) and according to requirements will make an emulsion or finely chopped mixture of such things as apples, celery and carrots in a few seconds. It can also grind coffee, shave ice and mix drinks.

"Turmix" food emulsifier

The eight-bladed stainless steel cutters which revolve at 12,000 r.p.m. cause turbulation of the mix sufficient to break down raw food fibres in a few seconds. The floating fibres are driven with considerable force to the sides of the vessel, where, due to wall impedances, they are driven upwards only to collapse on the cutters once more. This action pulps food into very small particles, making possible the production of many new fresh fruit and vegetable drinks.

Foot Switch

A moulded push-switch with a rotary contact action, which is primarily intended to be foot-operated, is available from ARCOLECTRIC (SWITCHES) LTD., Edwin Road, Twickenham, Middlesex. It is of Collier manufacture and 5A at 250-V rating, being of 1·5 in. by 1 in. by 2·3 in. (38 by 25 by 59 mm) overall dimensions and designed for one-hole through fixing.

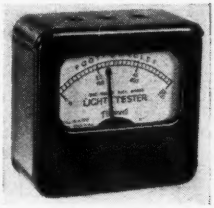
Another Fused Plug Outlet

Robustly constructed flush-mouting three-pin, 13-A plugs and socket outlets, conforming to B.S. 1363, are an addition to the "Nettle" range of accessories manufactured by VICTOR H. IDDON, LTD., Harper Road, Wythenshawe, Manchester.

The socket outlets are moulded square in shape and incorporate a safety shutter. The two current-carrying terminals are spring loaded to ensure correct alignment and a constant contact pressure. Earthing is obtained automatically by securing the cover to the conduit box by means of the fixing screws. A separate earth terminal is fitted for use if desired. The plugs embody an easily replaceable cartridge fuse and rectangular section withdrawable pins to facilitate wiring.

Pocket Light Tester

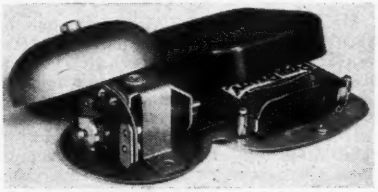
A small lightmeter in a black moulded case embodying a selenium photoelectric cell and a sensitive moving coil instrument is offered by FERRANTI, LTD., Hollinwood, Lanes. It has two ranges, one of 0-60 foot-candles with cell completely masked and the other of 0-300 foot-candles with the cell shielded. When using the lower range the shield can be clipped on to the bottom of the case. Each instrument is calibrated to conform generally with BS.667 for the portable type. The dimensions are 2·25 by 2·06 by 1·13 in. (57 by 52 by 29 mm) and the weight is 4·25 oz (0·12 kg).



Light tester with range shield in position

Battery Bell

A bell and battery unit taking up no more space than the normal bell, is an addition to the products of GENT & CO., LTD., Leicester. This "All-in-One" bell, which incorporates the solenoid action used in the maker's range of underdome bells, is driven by a standard flat pocket-lamp battery and if necessary can be used at 4-6 V a.c.



The "All-in-One" bell with gong and moulded snap-on battery cover removed

Economic Use of Electricity

Varied Opinions at I.E.E. Meeting

WAYS and means of securing the more "economic" utilization of electricity, mainly in order to conserve coal, were commented on in the paper which MR. R. B. GILES (consultant) submitted to the Institution of Electrical Engineers last week. The author covered a wide field, including power generation and distribution, industrial applications and household uses, but did not generally attempt to develop closely detailed arguments. Instances were quoted of uneconomical usage, in an endeavour to have them checked; proposals for improvement apparently being the "elimination" of unnecessary and wasteful uses.

The paper criticized too easy acceptance of prevailing practices and the neglect of "natural economics for purely financial considerations," claiming that unorthodox views were warranted by reason of the immediate need to conserve raw fuel.

"Inaccuracies and Omissions"

SIR JOHN KENNEDY, who opened the discussion, described the paper as "full of inaccuracies, mistakes, mis-statements and omissions," said that about 8 million tons of coal per annum was used in the production of electricity for domestic consumers, which was about equal to the amount saveable by railway electrification (the largest potential source of coal saving). The author had overlooked convenience and cleanliness and the housewife should not be prevented from using electric water heaters, irons and radiators when she could get sufficient electricity. Some domestic tariffs were too low, but load factors were 45 per cent for power and 29 per cent for other supplies in 1946-47, so that power was not subsidizing the others. He agreed with the author in advocating the utmost use of industrial plant in connection with public supply and of pass-out turbines in suitable cases. High load-factor industrial loads should be encouraged, but not on the basis of charging only the running cost.

Transformer and Cable Capacity

MR. J. HACKING (B.E.A.) pointed out that when two transformers were parallelled, although iron losses were doubled the much greater copper losses were halved, so that at near full load total losses would be reduced. Similarly it often paid to have cables in circuit in excess of the capacity required. He agreed with the value attached by the author to improving the thermal insulation of buildings. Experiments at the Building Research Station had shown that the insulation already available would, if generally adopted, save 40 to 50 million tons of coal yearly.

MR. E. L. E. WHEATCROFT (Merz & McLellan) gave the industrial consumption of coal as 40 million tons per annum, of which about half went to the heating of buildings and much of the rest in industrial low-grade heat. The latter could be supplied from near-by power stations, from which distribution would be easier than for domestic district heating.

MR. A. W. ATKINSON (Magnesium Elektron) stated that magnesium was the only light metal commercially produceable entirely from native resources. Electrolytic extraction called for blocks of cheap power from 10 kW and over at load factors up to 98 per cent.

MR. A. N. D. KERR (Electrical Power Engineering Co.) pointed out that to reduce the disparity between electric power per worker used in this country and in the United States would mean greater use of individual drives, increasing the difference between horse-power demanded and that installed to allow for varying load conditions. Works engineers had to consider reliability, interchangeability and the effect of voltage drop, as well as maximum demand and coal consumption. In both countries motors were rated for a 40 deg C temperature rise, but while the American manufacturer guaranteed 15 per cent continuous overload, the British manufacturer, using the same materials, did not. Motor manufacturers might combine to form a Power Service Bureau, like the Lighting Service Bureau, and users should make more use of the services of manufacturers' sales engineers.

Methods of Charging

MR. P. SCHILLER (E.R.A.) submitted that for high load-factor loads the kW demand charge should be based on the ordinary grid tariff, plus losses and profits and overheads, with a kWh charge similarly based. Electric space-heating should not be required to supplement central or district heating, because it would then use power-station capacity on only a few days in the year.

MR. C. J. O. GARRARD (G.E.C.) gave a warning that uranium would go in the same way as the fast diminishing coal resources. Oil was being used up in America faster than in the rest of the world put together.

MR. E. M. ACKERY (E.D.A.) pointed out that miners' hours were not the only consideration. The need was not to economize but to produce more. He used 44 kWh a week for water heaters in summer, which represented 57 lb of solid fuel, whereas the domestic boiler could not be kept alight with less than 112 lb. In the winter, when space-heating was needed, the independent boiler provided the answer. For school heating, with specially-designed electric fires at skirting level, 1 kWh was equivalent to 2·2 lb of coal used for central heating.

NEW BOOKS

National Certificate Textbook. Meter Testing.

Electro-Technology for National Certificate. By H. Teasdale, B.SC., and E. C. Walton, PH.D., M.I.E.E. Vol. I. Pp. 325; figs. 193; index. English Universities Press, Ltd., St. Paul's House, Warwick Square, London, E.C.4. Price 9s. 6d.

This is the first of three volumes which are intended to cover the Ordinary National Certificate and similar three-year courses, each volume covering roughly the syllabus for each year. This is an excellent method, since it keeps each volume within manageable limits both as regards size and price, while it also permits of each part of the subject receiving due attention.

The initial approach to any technical subject is always of great importance, so it is gratifying to note that the electron aspect of electrical phenomena has been introduced right from the commencement. One feels, however, that in view of the future possibilities of atomic energy in the generation of electricity, in outlining the structure of the atom, the fundamental idea of atomic fission could have been given. The electric current is next dealt with, but only towards the end of the book is the subject of magnetic fields reached. Thus, the elementary survey of the fundamentals of electro-magnetic induction, the electric generator and the electric motor is not given until the penultimate chapter.

The student should be given a working knowledge of the principles underlying the operation of these machines much earlier in the course. In each chapter the fundamental facts of the subject only are given, the more theoretical aspects, including the mathematical proofs of the various formulæ, appearing in an appendix to each chapter. Numerical examples (with answers) are given after each chapter and we commend the idea of leaving the student to obtain where necessary any additional data, such as resistivities and conductivities, from the useful tables at the end. The book can be thoroughly recommended to first year students.—A.R.

Electricity Meters and Meter Testing.—By G. W. Stubbings, B.SC., F.INST.P., A.M.I.E.E., (Second Edition). Pp. 220; figs. 62; index. Chapman & Hall, Ltd., 37, Essex Street, London, W.C.2. Price 16s.

The publication of this book is well timed; measurements will be one of the first considerations of all sections of the B.E.A. and one will need to brush up one's knowledge of the other man's tariffs and the methods by which he assesses them.

Due to load shedding, voltage reduction, etc., the author has kept in mind that the term maximum demand now means something to the industrialist as well as the supply engineer and after reading this book fewer people will ask, "What is power factor?" His mathematics are tidy and well backed up by diagrams.

The second half of the book will improve the knowledge of specialist meter engineers, many of whom talk glibly of design details which have relatively little effect, but who would do well to read more of the nature of meter errors which forms the basis of a chapter.

It would seem that the author has paid insufficient attention to the errors of instrument transformers, particularly as technical books on transformer design rarely deal with meter test room requirements; but the author, with his feet on the ground, is aware that it is desirable to test large meter equipments complete with their current and voltage transformers to ensure that the individual errors of the transformers are transferred to the combined errors of meter registration, ensuring that all variables are ironed out before the equipment is passed over to the consumer.

One suspects that the author is in favour of dial test methods as against measurement of the angular speed of the moving element. He shows that the same accuracy in final results can be achieved without being so worried about the variables during tests. Even in the most modern test stations one finds restrictions imposed upon the economic use of the equipment in one form or another, so one is glad to see diagrams of artificial power factor circuits included in this book.

The chapter on "Test House Equipment" should in these days have made more mention of the various designs, some amateur and some manufactured, which are now replacing the potentiometer batteries. Electronic devices are now being used to ensure a steady d.c. output when derived from erratic and fluctuating a.c. mains which will provide all the necessary d.c. voltages and milli-amperage necessary for standardizing voltmeters, wattmeters, etc., within the limits of accuracy required by the Electricity (Meters) Act.—W.B.A.

Books Received

Operation and Maintenance of Industrial Electric Motors. By G. W. Stubbings. Pp. 176; figs. 53; index. E. & F. N. Spon, Ltd., 57, Haymarket, London, S.W.1. Price 10s. 6d.

Questions and Answers on Batteries and Battery Charging. By E. Molloy. Pp. 127; figs. 78; index. George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2. Price 5s.

Automobile Chassis Design. By R. Dean-Averns. Pp. 238; figs 160. Iliffe & Sons, Ltd., Dorset House, Stamford Street, London, S.E.1. Price 15s.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1938

E. K. COLE, LTD., and H. A. Brooke.—"Permeability tuning for radio circuits." 8866. 5th October, 1938. (600601.)

1940

General Electric Co., Ltd., and D. C. Espley.—"Signalling apparatus." 8789. 16th May, 1940. (600651.) "Apparatus for echo-sounding by means of radio oscillations." 9740. 4th June, 1940. (600652.)

1941

General Electric Co., Ltd., L. Rollin, G. M. Tomlin, and H. Cobden-Turner.—"Electric relay and/or controlling systems." 10133. 8th August, 1941. (600701.)

1942

English Electric Co., Ltd., and R. H. Block.—"Ship propulsion equipment" and "Refrigerating machinery." 14928/9, respectively. 23rd October, 1942. (600553/4.)

1943

Western Electric Co., Inc.—"Systems for directionally radiating and receiving wave energy." 12942. 1st March, 1941. (600604.)

Sperry Gyroscope Co., Inc.—"Inductive couplings or transformer devices, particularly applicable to gyro magnetic compasses." 18805. 11th November, 1942. (600605.)

1944

Power Jets (Research & Development), Ltd., H. Constant, and W. R. Hawthorne.—"Internal-combustion turbine power plants." 7196. 18th April, 1944. (600608.)

M. N. Yardeny.—"Electrical control apparatus." 7682. 25th April, 1944. (600609.)

A. H. Stevens (Thomas & Betts Co.).—"Electrical sleeve coupling and terminal connectors." 13321. 12th July, 1944. (600711.)

S. S. Cramer.—"Electromagnets." 16938. 20th August, 1943. (600717.)

Bendix Aviation Corporation.—"Control devices for electric motors." 24666. 11th December, 1943. (600615.)

Erskine, Heap & Co., Ltd., and F. Waterhouse.—"Electric motor starter switches." 24809. 11th December, 1945. (600732.)

Westinghouse Electric International Co.—"Fluid blast electric circuit interrupters, having arc extinguishing means." 25194. 15th December, 1943. (600733.)

1945

W. E. O'Shei.—"Apparatus for generating an alternating current from a low voltage direct current source particularly for use on vehicles." 2182. 27th January, 1945. (Cognate application 3660/45.) (600737.)

Marconi's Wireless Telegraph Co., Ltd.—"Keying means for producing pulses of electrical energy of variable duration." 3250. 30th June, 1943. (600742.) "Frequency multiplier." 16982. 5th October, 1943. (600788.)

Teleregister Corporation.—"Electrically-controlled indicator systems." 3813. 15th January, 1944. (600743.)

Novobax, Ltd., and A. V. Sharman.—"Socket tubes for electrical plug and socket connections." 4005. 16th February, 1945. (600572.)

British Thomson-Houston Co., Ltd., and T. X. Lewis.—"D.C. electric motor control systems particularly adapted for electric vehicle drives." 4101. 19th February, 1945. (600744.)

Philco Radio & Television Corporation.—"Evaporator for refrigerators." 4792. 26th February, 1944. (600621.)

Patelhold Patentverwertungs- & Elektro-Holding, Akt.-Ges.—"Transformer for passing from electrically symmetrical systems to unsymmetrical systems and vice versa." 8455. 13th April, 1944. (600627.)

General Electric Co., Ltd., E. M. Leyton and H. M. Nelson.—"Heating of moulding materials by high-frequency electric fields." 10849. 30th April, 1945. (600669.)

Westinghouse Electric International Co.—"Electron-discharge devices." 12764. 11th May, 1944. (600773.) "Heating of strip metal by electromagnetic induction." 15104. 27th June, 1944. (600673.)

Telefonaktiebolaget L. M. Ericsson.—"Electromagnetic relays." 17356. 12th July, 1944. (600789.)

Authophon Akt.-Ges.—"Power supply for substation amplifiers." 17617. 9th March, 1944. (600675.)

R. A. M. Barbey.—"Electric calculator for studying correlative variations of quantities interconnected by a system of linear relations." 21510. 18th September, 1944. (600795.)

Reynolds Metals Co.—"Electrolytic production of aluminium." 24612. 30th January, 1945. (600799.)

Standard Telephones & Cables, Ltd., F. H. Bray and D. S. Ridler.—"Electric circuits using thermistors." 25081. 27th September, 1945. (600684.)

H. E. Page.—"Electric toaster." 25874. 17th October, 1944. (600637.)

Philips Lamps, Ltd.—"Circuits for the conversion of saw-tooth voltages into saw-tooth currents." 29548. 13th July, 1940. (600694.)

Trade Marks

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered within a month from 28th April:—

WEDA. No. 658,487, Class 10. Hearing aids for the deaf, and components parts thereof included in Class 10.—Frank Westerman (Wholesale), Ltd., 94, Dale End, Birmingham, 4.

INDOLOR. No. 658,621, Class 10. Electro-medical apparatus.—Stanley Cox, Ltd., 11, Gerrard Street, London, W.1.

SAXON (design). No. B651,318, Class 11. Lighting fittings included in Class 11, lighting installations, lampshades and light reflectors for lamps.—Saxon Components, Ltd., 66, Victoria Street, London, S.W.1.

CLASSIC. No. 651,718, Class 11. Lampshades.—Speights, Ltd., Classic Works, Mill Road, Dewsbury.

HOSTESS. No. 652,305, Class 11. Trolleys incorporating electrically heated receptacles for keeping cooked food warm.—L. G. Hawkins & Co., Ltd., 30-35, Drury Lane, London, W.C.2.

THE M.E. ADAPTABLE TWINS (design). No. B656,027, Class 11. Electrical heating apparatus and appliances and parts thereof included in Class 11.—Mica Elements (1937), Ltd., 42, Heigham Road, London, E.6.

Paris Fair

The 37th annual Paris Trade Fair, which opened on 1st May, has nearly 9,000 exhibitors showing their products in more than 80 sections of the 100 acres fair ground. British and American firms are well represented, especially in the machinery section. In all twenty-five countries are taking part. The Fair closes on 17th May.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Ashington (Northumberland).—U.D.C. Electrical work in connection with sixty new houses in North Seaton Road. B. Preston, U.D.C. surveyor.

Australia.—N.S.W. Railways. 2nd June. Fourteen 132-kV and seven 66-kV outdoor type circuit breakers. (Spec. 1196 and 1197.)

9th June. Two 6,000-kVA, two 44,000-kVA and two 55,000-kVA transformers. (Spec. 1199, 1200 and 1201.)

Chester-le-Street.—R.D.C. Electrical installation in sixty-six houses at Birtley and twenty-six in Plawsworth Road, Sacriston. F. Bowman, Estate Office, Great North Road, Birtley, Council architect.

India.—Office of the High Commissioner. Supply of 3,890 domestic type refrigerators.—Forms of tender from the Director General, India Store Department, 32-44, Edgware Road, London, W.2. (See this issue.)

Inverness.—17th May. Town Council. Electrical work at Dalneigh housing scheme (118 houses). J. Blackburn, burgh architect, 11, High Street.

Leeds.—10th May. Town Council. Portable generating set, meter testing machines, electric motors, electric drills and electrically operated petrol pumps. K. L. Forster, general manager, Civic Hall.

New Zealand.—13th July. State Hydro-Electric Department. 10,000-kVA synchronous condensers for Stoke substation. (Con. 85.)

27th July. Two 30,000-kVA synchronous condensers, Haywards substation. (Con. 84.)

South Africa.—20th May. Johannesburg. Railways and Harbours. Mercury arc rectifier traction substation equipment.*

Thetford.—15th May. Borough Council. Three automatic electric pumping stations, for sewerage and sewage disposal works. Elliott & Brown, Stanley House, Pelham Road, Nottingham.

* Specifications may be inspected at the Export Promotion Department, Thames House North, Millbank, S.W.1.

Orders Placed

Glasgow.—Corporation. Accepted. One 10/15-cwt. electric food delivery van (£892) and one 20/25-cwt. food delivery van (£1,020).—Scottish Motor Units. Two 15/20-cwt. electric low loading trucks (£441 each).—Industrial Motor Services.

Guildford.—Works Committee. Accepted. Fluorescent lighting in Market Street (£151).—Revo Electric Co.

London.—L.C.C. Accepted. Lighting installations at the following schools:—Elfrida School (Lewisham) (£1,847).—McGoff & Vickers; Whitmore School (Shoreditch) (£2,763).—Tucker Installations; Argyll School (St. Pancras) (£1,844).—G. N. Haden & Sons; Finsbury Park School (Islington) (£1,511).—Powerlite Electrical Installations; Plough Road School (Battersea) (£2,149).—Thorpe & Thorpe; Fleet Road School (Hampstead) (£2,410).—L. G. Tate & Co.; Peterborough School (Fulham) (£2,730).—Holliday & Son (Electrical); Rutland School (Mile End) (£1,360).—Ilford Electrical Co.

Middlesbrough.—Town Council. Accepted. Cables.—Hackbridge Electric Cable Co.

Tynemouth.—Corporation. Accepted. Lamps and columns.—Revo Electric Co. Reflectors.—G.E.C.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Andover.—Houses (56); borough engineer.

Ashbourne.—Houses (48), Park housing estate, for U.D.C.; E. G. Kington, architect, Market Place, Chesterfield.

Bedford.—Houses (60), Mile Road site, for T.C.; Kirk & Kirk, Ltd., builders, Atlas Works, Putney, S.W.15.

Billingham-on-Tees.—Technical school, Roseberry Road; county architect, Court Lane, Durham City.

Birmingham.—County primary school, Bromford Road, Castle Bromwich; E. L. Russell, chief education officer.

Blackpool.—Houses (118), Tyrone Avenue and Ardmore Road; R. Fielding & Sons, builders, Stanhope Road Works.

Boston.—Permanent houses (46), Fishtoft Road; borough surveyor.

Brighton.—Factory, 53-4, King Street, for Individual Shoes, Ltd.; Cuthbert Clarke & Co., builders, Jubilee Street.

Bristol.—Maintenance workshops, etc., Filton; British Overseas Airways Corpn., Airways Terminal, London, S.W.1.

Colchester.—Traditional houses (34), King George Road site; borough engineer.

Coventry.—Houses (50), Radford Aerodrome site; D. E. E. Gibson, city architect, 1a, Warwick Row.

Dover.—Houses (52), Westbury Road, for T.C.; Richard Costain, Ltd., builders, Dolphin Square, S.W.1.

East Elloe.—Agricultural houses (70); R.D.C. surveyor, Council Offices, West End, Holbeach.

East Retford.—Primary school, Tiln Road, for Notts. C.C.; William Moss & Sons, contractors, Hawthorne Avenue, Long Eaton.

Gloucester.—Dwellings (48), Wellsprings; A. Morgan, city architect, Suffolk House, Greyfriars.

Hastings. — Infants' school, Hollington; borough engineer.

Liverpool. — Houses (92), Brook estate; director of housing, Blackburn Chambers, Dale Street.

Llanelly.—Boys' grammar school, for Carmarthenshire E.C.; Henry Thomas & Co., Ltd., builders, Pottery Road.

London.—EAST DULWICH.—Dwellings (234), Lordship Lane and Dulwich Common, for Camberwell B.C.; John Grey & Partner, architects, 56, Oakley Street, S.W.3.

VICTORIA DOCK.—Mill and warehouse; Spillers, Ltd., 40, St. Mary Axe, E.C.3.

PADDINGTON.—Dwellings (60), Peach Street (about £123,000); Holloway Bros. (London), Ltd., Millbank, S.W.1.

Loughton.—Secondary school, Borders Lane; H. Conolly, county architect, County Hall, Chelmsford.

Lowestoft.—Houses (102), Harris Avenue; borough surveyor.

Norwich.—South wing of technical college; city architect, Municipal Offices.

Oldham.—Houses (80), Limeside estate, for T.C.; Geo. Wimpey & Co., Ltd., builders, Tilehouse Lane, Denham, Uxbridge.

Day nurseries at Haven House, Mayall Street and Honeywell Lane (£26,500); borough engineer, 75, Union Street.

Penge (Kent).—Flats (72), in two blocks, Queen Adelaide Road, for U.D.C.; Edward Armstrong, architect, 19, Manchester Square, London, W.1.

Penzance.—Houses (46); borough surveyor, Town Hall.

Plymouth.—Factory, Ernsettle Lane, for Mace, Rainbow & Stone, Ltd., 25, Berners Street, W.1; Donald Hamilton & Partner, architects, 1, Connaught Place, Hyde Park, London, W.2.

Scheme for 300 houses and shops, Union Street, Stonehouse, for Corporation; Louis de Soissons & Partners, architects, 3, Park Square Mews, London, W.1.

Rochester.—Brick houses (44); Stoner & Sons, surveyors to the T.C., Bank Chambers, 329, High Holborn, London, W.C.1.

Salford.—Primary school, Higher Broughton, for R.C. authorities; Rev. M. Daly, P.P., St. Thomas of Canterbury, Higher Broughton.

Scunthorpe.—Secondary modern school, for Lindsey C.C.; Bernard Pumfrey, Ltd., builders, Wintern Works, Carlisle Street, Gainsborough.

Sheffield.—Omnibus garage, Herries Road, for Transport Department; city architect.

Smethwick.—Extensions to factory; T. Mason & Son, Ltd., Grantham Road.

Stretford.—Grammar school for girls, Edge Lane; G. Noel Hill, county architect, Preston.

Surbiton.—Flats, Mansfield estate (72) and Gosbury Hill estate (230); borough surveyor, Ewell Road.

Walsall.—Houses (134), Dudleys Fields site; borough surveyor, Council House.

Wigan.—Glass works, Platt Bridge, for Co-operative Wholesale Society, Ltd.; W. A. Johnson, architects' department, 1, Balloon Street, Manchester, 4.

Wolverhampton.—Dwellings (178), Warstones Road estate; borough engineer, Town Hall.

Worcester.—Schools, Henwick Grove and Ronkswood; Jackson & Edmonds, architects, 65, New Street, Birmingham, 2.

Jersey Airport Equipment

THE States of Jersey are equipping their airport, which is one of the busiest in Europe in proportion to its size, with " Abas " (aircraft blind approach system) which is the British version of the instrument landing system required by I.C.A.O. Regulations to be installed at all international airports. It is based on the American SCS-51 system used during the war and has been developed and produced by Pye, Ltd., of Cambridge, under a British Government contract, with the technical collaboration of the Marconi Co.

The Jersey airport is also to have new Marconi v.h.f. direction finding equipment which is capable of operation from distances of up to about 30 miles (48 km) over normal telephone lines, the equipment itself being entirely unattended on the site. The system enables the positions of as many as four aircraft to be fixed at the same time and displayed independently. Instantaneous visual indications of the bearings are given on the appropriate cathode-ray tube.

Other Marconi apparatus installed at Jersey Airport includes v.h.f. and medium frequency communication equipment and medium frequency direction finders.

Bournemouth Illumination Design Course

A one-day illumination design course was held last week at the Bournemouth premises of the British Electricity Authority, Southern Area. The speakers were Messrs. W. Robinson, K. R. Gibbins, and T. O. Freeth. The lectures were arranged by Kennedy's (Bournemouth), Ltd., in conjunction with E.L.M.A.